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THE PUBLIC HEALTH LABORATORY SERVICE BOARD

Dr. C. E. Gordon Smith, Dean of the London School of Hygiene and Tropical Medicine, and a member of the Board since April 1971 succeeded Dr. E. T. C. Spooner as Chairman of the Board on 1st August 1972.

Professor P. Wildy completed his term of office as a member of the Board on 31st July 1972, and was succeeded by Dr. D. G. Evans, Director of the National Institute for Biological Standards and Control.

DR. E. T. C. SPOONER
Chairman of the Public Health Laboratory Service Board
1963 - 1972

THE PUBLIC HEALTH LABORATORY SERVICE BOARD

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(late Under-Secretary, Board of Trade)

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(Medical Officer of Health, Oxford)

G. I. Watson, O.B.E., M.D., F.R.C.G.P., D.T.M. & H.
(Medical Practitioner, Peaslake, Surrey)

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M. T. Parker, M.D., F.R.C.Path., Dip.Bact.

Secretary:
J. D. Whittaker, M.B.E.

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Sir James Howie, LL.D., M.D., F.R.C.P., F.R.C.Path. (*Director of the Service to 30th September 1973*)

R. E. O. Williams, M.D., F.R.C.P., F.R.C.Path. (*Director of the Service from 1st October 1973*)

J. C. Kelsey, M.D., F.R.C.Path., Dip.Bact. (*Deputy Director of the Service: see also* page 42)

J. D. Whittaker, M.B.E. (*Secretary of the Board*)

R. H. Westlake (*Finance Officer and Deputy Secretary of the Board*)

R. Toomey (*Deputy Finance Officer*)

B. D. Cunningham (*Establishments Officer*)

R. V. Jackson (*Accountant and Supplies Officer*)

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WITH COMPLIMENTS

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* Member of the staff of the Medical Research Council.

INTRODUCTION

ADMINISTRATION AND ORGANISATION OF THE SERVICE

The Public Health Laboratory Service is the successor of the Emergency Public Health Laboratory Service planned, organised and administered during the war years 1939–1945 by the Medical Research Council, at the request of H.M. Government. In 1945 it was decided by the Government to retain the Service on a permanent footing. Statutory authority was provided by Section 17 of the National Health Service Act, 1946, which empowered the Minister of Health to provide a " bacteriological service " for the control of the spread of infectious diseases. Later the Medical Research Council agreed to an extension of the period of their administration, with the delegation of detailed responsibility to the Public Health Laboratory Service Board appointed by them for this purpose. In 1960, however, the Public Health Laboratory Service Act, 1960, established and incorporated a new Public Health Laboratory Service Board as a statutory body capable of acting in its own right as agent for the Minister. The Act also provided for the transfer of staff of the Service from the employment of the Council to that of the Board, and the transfer of property from the Council to the Minister of Health; these transfers took effect on 1st August, 1961.

The Chairman and members of the Public Health Laboratory Service Board are appointed by the Secretary of State for Social Services and, in accordance with the Schedule to the Act, the members must include the following (and must therefore be at least eight in number, in addition to the Chairman):

(*a*) not less than two persons appointed after consultation with the Medical Research Council;

(*b*) not less than two persons with experience as microbiologists, appointed after consultation with such organisations as the Secretary of State thinks appropriate;

(*c*) not less than two persons holding office as medical officer of health to a local authority;

(*d*) not less than one person appointed after consultation with such organisations as appear to the Secretary of State to represent the hospital service;

(*e*) not less than one fully registered medical practitioner engaged in general medical practice, appointed after consultation with such organisations as the Secretary of State may recognise as representative of practitioners so engaged.

The Chairman and members of the Board are normally appointed for a term of three years.

The Board exercises its functions in accordance with any directions received from the Secretary of State for Social Services. In the exercise of these functions it acts as a principal.

The staff of the laboratories of the Service are appointed and employed by the Board. The directors of the constituent laboratories are whole-time medically qualified microbiologists, with full consultant status. Professional staff are selected to a large extent from newly qualified medical graduates after they have held house appointments for 12 months or longer, they then receive five years' training in pathology and microbiology. During the third year the trainee is required to obtain the Diploma in Bacteriology of the University of London or of the University of Manchester. The Service also receives fully trained recruits from the Hospital Service and from the universities. As a general rule, science graduates without medical qualifications are employed only in the reference laboratories (*see* page 42) where the work is of a highly specialised nature.

The technical staff of registered medical laboratory technicians are recruited from boys and girls leaving school at 16 to 17 years of age, who have attained the necessary standard of education; they go through a system of training in academic and practical subjects now becoming general in pathological laboratories throughout the country.

The development of the Service between 1946—in which year it was established in its present form—and 1972 may be summarised as follows:

	1948	1955	1962	1972
Number of Constituent Laboratories	36	56	59	62
Medical staff	84	124	132	135
Scientific staff		26	39	82
Technical, Clerical and Maintenance staff ..	562	778	956	1,289
Total specimens examined ..	793,314	1,689,033	2,314,126	4,174,000

SCOPE OF THE SERVICE

The Public Health Laboratory Service is designed to make the laboratory investigations needed to provide a continuous picture of the communicable microbial diseases of England and Wales. These diseases must be accurately defined by identifying the agents that cause them, by continuously seeking out and recording their whereabouts, and by investigating what really matters in promoting or limiting their spread. The activities of the P.H.L.S. allow useful advice to be offered to the central and local health authorities, and to others concerned with the control and prevention of these diseases.

The Service at present consists of 10 Regional Laboratories (*see* page 32), 52 Area Laboratories (*see* page 34), and 15 Reference and Special Laboratories (*see* page 42), most of the latter being grouped as the Central Public Health Laboratory at Colindale, London, NW9 5HT. Almost all the Regional and Area Laboratories are situated in hospitals, and in addition to their special functions within the Public Health Laboratory Service, act as the microbiological component of a group laboratory undertaking clinical work for the hospital staff, local general practitioners and medical officers of health. Specific public health work is also undertaken for medical officers of health over a wider area. In certain places where there is not a Public Health Laboratory, arrangements are made for this work to be done by a hospital microbiologist acting for the Public Health Laboratory Service. Personal consultation between clinicians and the medical staff of local health authorities are welcomed. Members of the laboratory staff are prepared to investigate outbreaks of communicable disease in the field if asked to do so.

In certain circumstances Public Health Laboratories receive specimens from general practitioners outside the normal clinical area of the group laboratory; for example, specimens of public health interest requested by the medical officer of health, or specimens needed as part of one of the nationwide surveys which form a major activity of the Service. The Reference and Special Laboratories normally receive specimens only from other laboratories.

All specimens must be submitted by doctors, veterinarians, dentists, public health inspectors, and others acting on behalf of medical officers of health, Government Departments, or representatives of other official bodies; specimens cannot be accepted from private persons (see, however, sub-paragraph (*b*) below).

The routine specimens fall under two main heads:

(*a*) " Clinical " specimens received from hospitals, general practitioners and local health authorities. These are specimens of sputum, faeces, throat swabs, blood samples, etc., taken from persons suspected of suffering from (or being capable of transmitting) a microbial disease.

(*b*) " Sanitary " specimens: these are received from medical officers of health, public health inspectors, and others concerned officially with the control of the public health. They comprise specimens for bacteriological examination of water, shell-fish, watercress, sewage, milk and cream; of processed foods such as ice-cream, artificial cream and canned foods; and of imported products such as the various forms of meat, fish, processed egg, coconut and fertiliser. The Service normally examines only material offered to the consumer, but will, of course, examine specimens taken at any stage of production or distribution by medical officers of health investigating suspected food-borne infections. The Service is ready to give free advice to food manufacturers and processors to assist them in the production and distribution of bacteriologically safe products. For routine control of such products, commercial firms are charged a fee, but work of this sort is undertaken only exceptionally.

The epidemiological work of the Service includes not only the investigation of outbreaks of infectious disease, in co-operation with local medical officers of health, but also studies of the distribution and behaviour of infectious agents throughout England and Wales, and of the various aspects of the immunisation programme. Epidemiological information is collected centrally week by week from public health and hospital laboratories all over the country, including Scotland, Northern Ireland and Eire and then made available to each of these laboratories in turn in the form of a confidential weekly " Communicable Diseases Report ".

Field investigations of infectious disease, and field trials of protective agents, including vaccines, are frequently carried out. All laboratories are engaged to some extent in research in addition to routine work.

A special feature of the Service is the investigation of various problems by Working Parties containing a dozen or more members drawn from laboratories in different parts of the country. Some of the problems investigated are of direct concern to Government Departments, with which close working relations have always existed.

Brief mention has already been made of the reference laboratories and specialist departments. These provide facilities for the exact identification and " finger-printing " of organisms belonging to many different groups. This is sometimes required by clinicians in their treatment of patients, but more often for epidemiological purposes. The reference laboratories are freely available for consultation by any laboratory within or without the Service. Some of these typing facilities are available at regional and area laboratories; before sending specimens to a reference laboratory the local Public Health Laboratory Service Director should be consulted. In addition, a number of reference experts are retained for the examination of occasional specimens which require special skill, special knowledge, or special reagents.

The Service distributes various vaccines and sera on behalf of the Department of Health and Social Security. It also provides certain reagents for diagnostic purposes, prepared by or issued from the Standards Laboratory for Serological Reagents at the Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT (*see* page 44).

Directors of Public Health Laboratories are always prepared to discuss the facilities they can offer, either directly or through other units of the Service, and how these facilities may best be used.

GRANTS AND OTHER ASSISTANCE RECEIVED OR RENEWED FOR SPECIAL INVESTIGATIONS IN 1972

The Public Health Laboratory Service Board now receive valuable assistance from the Departmental Research and Development Fund of the Department of Health and Social Security. Allocations from this fund have enabled the Board to undertake the following important projects, involving research work of an " operational " nature:

A study of the use of a computer for the identification of bacteria.

Laboratory investigations into farmers' lung.

An investigation of laminar flow ventilation and the determination of its effectiveness in protecting hospital patients who are at special risk to cross-infection.

An investigation into hepatitis in a special community.

The establishment of reference facilities for monitoring transferable drug resistance.

The surveillance of whooping cough and B.C.G. vaccines.

The Board also receive grants from the following bodies for the assistance of special investigations and the acquisition of major equipment of a special nature:

(*a*) From the World Health Organisation:

$5,000 for the assistance of laboratory research on enteric phage-typing at the International Centre recognised at the Enteric Reference Laboratory, Colindale, London.

$5,000 for the International Shigella Centre recognised at the Dysentery Reference Laboratory, Colindale, London.

$5,000 for the International Reference Centre for Staphylococcal Phage-typing recognised at the Cross-Infection Reference Laboratory, Colindale, London.

$2,500 towards the cost of testing the specificity of virus antisera at, and the supply of viral antigens and positive control sera by the Standards Laboratory for Serological Reagents, Colindale, London.

$2,500 for the preparation and testing of reagents (rhinovirus), at the Virus Reference Laboratory, Colindale, London.

$4,000 towards the cost of epidemiological serological investigations of tropical sera for antibodies in treponematoses at the Venereal Diseases Reference Laboratory, London Hospital Research Laboratories, London.

$1,500 for research on the bacteriology of leptospirosis at the Leptospirosis Reference Laboratory, London School of Hygiene and Tropical Medicine.

(*b*) From the British Diabetic Association:

Dr. D. R. Gamble (Director, Public Health Laboratory, Epsom).

Provision for an investigation into certain aspects of viral pancreatitis, and the part played by viral infection in the development of diabetes, with particular reference to coxsackie virus infection.

Laboratory Directors in the Service are also carrying out investigations in conjunction with general practitioners and hospital medical officers in many places, notably in the study of chronic bronchitis, of hospital cross-infection, and of sterilisation and disinfection problems; on gastro-enteritis and the safety of various foods.

A clause of the Schedule of the Public Health Laboratory Service Act, 1960 permits the Board to accept, hold and administer private gifts on trust for any purpose related to the Public Health Laboratory Service or otherwise connected with bacteriological research. Donations received during 1972 were as follows:

£350 in each of seven years from 1971 to 1977 inclusive, from Ethicon Limited for research in the Cardiff joint Laboratories.

£1,170 from Pfizer Limited towards the cost of research on Indanyl Carbenicillin being undertaken by Dr. D. J. H. Payne of the Portsmouth Laboratory.

£100 from Upjohn Limited for a clinical trial on Bacteroides infection being undertaken at the Portsmouth Laboratory.

REVIEW BY THE DIRECTOR OF THE SERVICE OF ACTIVITIES IN 1972

LABORATORIES

The Regional Public Health Laboratory, Liverpool moved to new accommodation at the newly built Fazakerley Hospital, Lower Lane, Liverpool on 28th February 1972.

DEATH

It is with great regret that we have to report the death on holiday of Dr. L. Hoyle, Director of the Area Public Health Laboratory, Northampton since 1945. Dr. Hoyle joined the Service in September 1939.

NEW APPOINTMENTS

The following Consultant appointments were made during 1972: Dr. G. L. Gibson, Director of the Regional Public Health Laboratory, Leeds, Dr. C. Dulake, Director of the Area Public Health Laboratory, County Hall, London; Dr. W. L. Hooper, Director of the Area Public Health Laboratory, Poole; Dr. C. A. Morris, Director of the Area Public Health Laboratory; Shrewsbury; Dr. R. Y. Cartwright, Deputy Director of the Area Public Health Laboratory, Guildford; Dr. A. A. Codd, Consultant at the Regional Public Health Laboratory, Newcastle; Dr. J. Craske, Consultant Microbiologist at the Area Public Health Laboratory, Poole; Dr. Ruth James, Consultant Microbiologist (part time) at the Area Public Health Laboratory, Maidstone; Dr. R. R. Marples, Consultant Microbiologist at the Cross-Infection Reference Laboratory, Colindale; Dr. O. A. Okubadejo, Consultant Microbiologist at the Area Public Health Laboratory, Portsmouth; Dr. Sheila Polakoff, Consultant Epidemiologist at the Epidemiological Research Laboratory, Colindale; Dr. W. Shepherd, Consultant Microbiologist at the Area Public Health Laboratory, Norwich; and Dr. C. E. Watson, Consultant Microbiologist to the Farnham and Guildford & Godalming Groups, in association with the Area Public Health Laboratory, Guildford. Dr. Cartwright, Dr. Marples, Dr. Shepherd and Dr. Watson will take up their appointments early in 1973.

LOCUMS

We are most grateful to the following people for help with locum duties: Dr. Bessie H. E. Cadness-Graves at Watford; Dr. R. Norton at Stafford and Sunderland; Dr. D. A. Skan at Southampton; Dr. Joan Taylor at Salisbury.

ROUTINE WORK OF THE SERVICE

In 1972 the 62 Regional and Area Laboratories of the Service examined 4,174,000 specimens (an increase of 5 per cent on last year's figure), of which 327,000 were virological (an increase of 15 per cent on last year's figure). As before, the work came from hospitals, local health authorities, general medical practitioners, and veterinarians. The routine work continued to provide the basis for numerous epidemiological investigations and for a number of surveys. The extent and nature of these activities may be judged from the committees and working parties (pages 65-70, Appendix I) and to lists of published papers (pages 71-82, Appendix II).

In the section on scientific work, which follows, eight short articles summarise certain matters of general interest which seem suitable for presentation in this form.

SCIENTIFIC WORK

The Communicable Disease Report Computer Analysis

In 1972 an examination was made of the methods used to process data for the Communicable Disease Report (CDR).

Every week PHLS and many hospital laboratories report the number of viruses and important micro-organisms identified during the previous week. These reports, which are accompanied by relevant epidemiological information, are analysed by the Epidemiological Research Laboratory and circulated in the CDR to contributing laboratories, Medical Officers of Health, and the Department of Health and Social Security. Copies are also sent to infectious disease physicians, research institutes and departments, and to various public health and research organisations abroad.

The facts reported in the Communicable Disease Report are useful in various ways. For example, microbiologists are kept aware of the organisms currently being isolated in other laboratories: the relative frequency and clinical features of communicable diseases at different times and places may be compared; and the origin and course of outbreaks examined. The report is a valuable adjunct to statutory notification since it provides precise evidence of the identity of the organisms responsible for disease and because many of the diseases it reports are not statutorily notifiable.

For several years reports were received from PHLS laboratories only, the volume of information was relatively small, and the sorting and analysis of the CDR reports each week could be done conveniently by hand and, since 1967, by simple mechanical methods. As time has passed, the number of contributing laboratories has steadily grown. The number of hospital laboratories on the list of contributors has increased annually since the first few began to report in 1953, and at present number about 500. Laboratories in Scotland began to report in 1967; and the circulation of the report more than doubled in 1969 when the CDR was sent to Medical Officers of Health. This growth has been accompanied by substantial increases in the number of specimens examined in U.K. laboratories and in the frequency of requests for special analysis of stored data. It thus became necessary to consider the stage had been reached when a computer should be used in the processing of CDR reports.

A comprehensive study of the problems involved has now been made by Scientific Control Systems Limited (Scicon) who have advised that the volume and variety of data now justify the use of a computer. For the time being it will not be necessary to instal a computer at Colindale; time will be made available on a computer based elsewhere.

The Scicon study inevitably raised other questions concerning the CDR information and reports. A serious deficiency stems from the fact that the laboratories report only positive isolations and serological identifications. Specimens in which no pathogen is identified are not reported. With this system a relative increase in reports of one type of infection from a single area, in a single period, or in a specific age group, may be due merely to an increase in the number of specimens examined. Moreover, outbreaks in which no pathogen is identified are liable not to be reported. Clearly a better indication of changes in incidence could be secured if the total number of specimens examined was known. Negative reporting has a special relevance for virus examinations and Scicon have therefore recommended that the practical implications involved should be examined, initially on a pilot scale, in a few virus laboratories.

The implementation of the Scicon proposals is now under way. It is expected that the change to computer-assisted analysis will be completed in about one year.

Clinical Significance of TRIC Agents

TRIC agents are members of subgroup A of the Chlamydia or Bedsonia group of obligate intracellular micro-organisms which resemble bacteria, not viruses, since they possess both DNA and RNA. Subgroup A differs from subgroup B (which has members such as the psittacosis and meningo-pneumonitis agents) in that inclusions formed by members of the second group do not contain iodine-staining carbohydrate material.

The causal agent of trachoma, a TRIC agent, was isolated in the yolk sac by T'ang and his colleagues in 1957, half a century after the intracellular inclusion characteristic of the disease had been recognised in conjunctival epithelium. During this period similar inclusions had been observed in inclusion conjunctivitis of the newborn (also called inclusion blennorrhoae), inclusion conjunctivitis of adults, the genital epithelium of some semen, and non-gonococcal urethritis in males. The history of research in this field during this period is excellently reviewed by Thygeson (1962).

Agents similar to that isolated by T'ang have since been isolated from trachoma in most countries of the world where there is trachoma, and in some where it is not commonly realised that this infection exists (Mordhurst 1967). Furthermore, seemingly identical agents have been isolated from inclusion blennorrhoea and inclusion conjunctivitis, thus giving the basis for the introduction of the term TRIC agent (Gear *et al* 1963). Such agents have been widely studied and in addition to numerous publications there have been three international conterences related to trachoma with subsequent proceedings (Gordon 1962, Hanna *et al* 1967, Nichols 1971).

TRIC agents cause the ocular syndromes mentioned above and a punctate kerato-conjunctivitis, Rhinopharyngitis, otitis media, and laryngitis often complicate these infections, and upper respiratory findings may suggest an adenovirus infection. TRIC agents have been isolated from the posterior nasopharynx and the middle ear, and inclusions have been seen in scrapings from the region of the Eustrachian tube.

TRIC agents have been isolated from the genital tracts of both sexes in cases with the above ocular syndromes and from parents of babies with TRIC ocular infection. During this work it became clear that isolation in the yolk sac is an insensitive method of detecting TRIC agents. Nevertheless it has been shown that TRIC agents are present in from about 10-20 per cent of cases of non-specific urethritis. Such findings led to the hypothesis that in countries where trachoma is not endemic, there is a large genital reservoir of TRIC agents which are spread mainly by sexual activities (Jones 1961); furthermore it is postulated that TRIC ocular infections in these circumstances are mainly secondary to genital infections and are not spread usually by eye-to-eye transmission as in areas of the work where trachoma is endemic. As would be expected, TRIC agents are detected more frequently in the genital tracts of a promiscuous population.

Immunofluorescence methods may be used to detect TRIC agents, and comparisons between the value of such methods and others (isolation in eggs, Giemsa staining, iodine staining, antibody detection) have been carried out in ocular infections with varying results and opinions. Certainly in some types of TRIC ocular infection, such as subclinical or chronic disease, immunofluorescence techniques have so far been the best for diagnosis. Laboratory methods are now of paramount importance in investigating the clinical and epidemiological significance of TRIC infections. Improved isolation techniques have used irradiated McCoy cell monolayers and inoculation of specimens by centrifugation (Darougar *et al in* Nichols 1971); and they have already produced an isolation rate of over 40 per cent from men with non-specific urethritis (NSU). Isolates have been grown also from the genital tract in female consorts of such men and from the rectum in women either with TRIC infection in another site or with an epidemiological association with TRIC infection. Thus in women there is a rectal as well as a genital reservoir of TRIC agents. Kuo *et al* (1972) recently described an isolation system using non-irradiated HeLa cells treated with DEAE-Dextran which gave comparable results to irradiated McCoy cells. Development of improved methods of isolation has brought investigation of TRIC agents within the scope of those interested in this particular subject; but since the methods are still cumbersome and very different from those usually carried out in most laboratories, isolation of these agents cannot yet be regarded as a normal part of routine diagnostic microbiology.

A microimmunofluorescence method for typing TRIC agents has been devised (Wang *in* Nichols 1971); 6 serological types (A-F) of TRIC agents are recognised (there will probably be more); and typing is of great importance in clarifying the epidemiology of TRIC infections. Thus TRIC agents of types A, B, or C have been isolated from eyes of trachoma cases in areas where the disease is endemic and where eye-to-eye transmission is presumed. On the other hand isolates from the genital tract, both from trachoma endemic and non-endemic areas have been typed as D, E, or F, as have isolates from the TRIC ocular syndromes, most of which have genital associations, from non-endemic areas.

There are rare eye isolates among the last serotypes from endemic areas, presumed to be associated with genital transmission at some point.

In this country, the main genital reservoir of TRIC agents is in cases of NSU and their consorts, TRIC agents probably being a major cause of NSU (although this has yet to be proved) and possibly causing genital disease in women. Further studies of TRIC infections are needed both in promiscuous and non-promiscuous populations; and such studies are being undertaken in certain Public Health Laboratories.

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Investigations for Staphylococcal Enterotoxins

Although staphylococci were not recognised before 1880 when Pasteur found them in pus, these organisms have undoubtedly caused food poisoning for centuries. Outbreaks were reported by several workers but went largely unnoticed until 1930 when the role of staphylococci in food poisoning was rediscovered (Dack, Cary, Woolpert, and Wiggers, 1930). The illness is an acute gastro-enteritis resulting from the ingestion of food containing the enterotoxin formed by certain strains of *Staphylococcus aureus*. At least five serologically distinct enterotoxins (A. B. C. D. and E) have been identified and all have been implicated in outbreaks in the U.S.A. and in the U.K.: enterotoxins A and D are the predominant types in outbreaks in both countries.

Until fairly recently the detection of enterotoxin in culture filtrates or in foods was dependent on human volunteer or monkey feeding tests or parenteral injection into kittens or cats. However the diligence of Professor M. S. Bergdoll, University of Wisconsin, and the late Dr. E. P. Casman, FDA, Washington, DC, has resulted in the purification of the enterotoxins, the preparation of specific antisera and the development of serological methods for the detection of enterotoxin.

Early work in the PHLS showed that the kitten test (Fulton, 1943) and the isolated rabbit gut test (Kelsey and Hobbs, 1954) could not be relied upon to determine either the presence or absence of enterotoxin in culture filtrates. More recently attention has been focused on the detection of enterotoxin by a slide-gel double diffusion technique (Šimkovičová and Gilbert, 1971) adapted from that described by Crowle (1958). Representative strains of *S.aureus* from 89 separate incidents of staphylococcal food poisoning in this country produced enterotoxins A. B. C. D. or E (Gilbert and Wieneke, 1972); a further five strains did not produce these toxins but culture filtrates of each produced an emetic response in monkeys typical of staphylococcal food poisoning (Bergdoll, pers. commun.). Eighty-eight of the 94 strains were lysed by phages of group III, confirming the findings of numerous workers that a staphylococcus incriminated in food poisoning is most likely to be lysed by group III phages. However, enterotoxin studies on about 600 cultures isolated from a wide variety of foods not associated with food poisoning and on 200 cultures from wound infections among hospital patients indicated that it was impossible to predict whether a phage-group III strain would produce enterotoxin.

Although the phage-typing of cultures and enterotoxin production tests were valuable tools in the investigation of staphylococcal food poisoning outbreaks, the demonstration of enterotoxin in the suspected food itself is even better proof of staphylococcal involvement. Such detection would be especially important if cooking had killed the organisms but left the heat-resistant enterotoxin still active, although as yet there is little published evidence of this; also, in some foods such as cheese, most of the organisms may have died during storage (Zehren and Zehren, 1968).

Enterotoxin has been detected serologically in extracts of food samples from 16 outbreaks, 11 samples contained enterotoxin A, three contained D, one both A and B, and one both A and D. The method in current use is based on that of Casman (1967) and involves the extraction, concentration, and purification of trace amounts of enterotoxin from the food (Gilbert, Wieneke, Lanser, and Šimkovičová, 1972). Quantitative tests on 12 foods for enterotoxin A or A and B gave results on the range <0.01 to 0.25 μg of toxin per gram of food.

There is a need for a more simple and shorter method for detecting minute amounts of enterotoxin in food. Further work to develop rapid and sensitive techniques such as immunofluorescence and reversed passive haemagglutination are likely to be made, but in the meantime the micro-gel diffusion test is the only available routine method.

Interest in the enterotoxins has also been aroused because it is suggested that certain strains of *S.aureus* producing enterotoxin-B play an important role in post-operative wound infections (Lindhom, Laurell, and Grenvik, 1967). Furthermore, there is strong evidence of an association between methicillin resistance and enterotoxin-B production among hospital strains of staphylococci (Dornbusch, Hallander, and Lofquist, 1969; Hallander, and Laurell, 1971); and work on the genetic determinants of these factors is under investigation.

We are in a fortunate position with our enterotoxin studies because PHLS laboratories investigate food poisoning outbreaks on a national scale and because of the willingness of Directors to send us cultures and foods for examination. This is a team effort.

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Contamination of Transfusion Fluids

In March 1972 patients at a Devonport hospital became ill after the intravenous infusion of 5 per cent dextrose, and some died. Contamination was rapidly, and most astutely, suspected by the clinical staff; and the Director of the local PHLS laboratory was called in. Examination of the suspect fluids revealed widespread contamination and an assortment of gram-negative bacteria was isolated. These were subsequently identified at the National Collection of Type Cultures as klebsiellas, erwinias and enterobacters, which indicated contamination from environmental sources. It was also noticed that the metal caps of contaminated bottles were less dull than those where contamination was not found. This suggested under-processing by the manufacturer and this was subsequently confirmed by visiting inspectors of the Department of Health. The matter was investigated by an official inquiry, which was subsequently published. Later in the same year another incident at Kettering was investigated locally and at the Oxford PHLS laboratory, from which visits were made to the factory concerned. A similar assortment of organisms to that found at Devonport was isolated, and although various deficiences were found, the cause of the contamination was never clearly identified.

Partly as a result of these incidents the Department of Health has intensified its inspection of manufacturing procedures and has laid down the principle that standards in hospital pharmacies should be no less rigorously controlled than those required of industry. The implications of this recommendation are still being worked out, and will include a review of where hospital production of intravenous fluids will take place (with concentration in a limited number of centres), management control of manufacturing processes, and microbiological control of the products. Most of these implications are administrative and the most important safeguards are, and always have been, the conscientious application of simple and well-tried principles aimed at the process, rather than at the product. The limitations of sterility testing as a routine control measure are well known. Improved tests are also needed for the integrity of bottles and closures; the PHLS has already some experience in this in connection with specimen containers. A further field for investigation is the growth requirements for micro-organisms in infusion fluids. In several of the incidents referred to earlier there was visible contamination with high bacterial counts, yet when the strains were isolated it was usually very difficult to achieve high counts or visible contamination on re-inoculation into sterile fluids. This clearly needs further investigation. It may be possible, by adding small and innocuous amounts of a nitrogen source (with perhaps some growth factors), to encourage contaminants to grow until visible turbidity is obtained, so increasing the chance of detection.

One feature of the recent incidents was the use of the NCTC's Computer Project to identify organisms that in the past have been hard to characterise. This enabled a relationship to be established between strains isolated from different sources. So far this has not enabled sources of contamination to be unequivocally identified, but it is certain that these methods should be used in any further incidents that may take place, and this emphasises the need for all clinical material and suspect fluids to be kept and carefully investigated as soon as possible. The NCTC is always willing to receive such strains.

Microbiologically, 1972 has been the year of contaminated intravenous fluids. The PHLS has been deeply involved in these events, and continues to be concerned in planning and implementing the steps that will be needed to make such disasters as infrequent as they deserve to be.

Recent Work on Respiratory Viruses

(a) *Influenza.*

The prevention of influenza remains a major problem. Much of this virus' success in causing acute respiratory illness is attributed to the changes in the surface antigens of the influenza A virus. These changes may be great, as was observed between the Hong Kong strain, A/Hong Kong/1/68 (H3n″), and the previous Asian strains. e.g. A/Singapore/1/57 (H2N2). Less marked differences, " antigenic drift ", are also observed when the virus remains antigenically related to the preceding serotype.

It is most important that any change in the antigenic structure of the influenza virus should be quickly recognised, for unless the new strain is incorporated into the current vaccine, immunisation is unlikely to be successful. One of the functions of the Service is to monitor, from year to year, the nature of the circulating strains of influenza virus. This is achieved by the examination of material from respiratory illnesses at regional and area laboratories, which subsequently send the strains of influenza A virus isolated to the Virus Reference Laboratory (VRL) for antigenic analysis. During the winter 1971-2 a single strain, A/England/42/72 (HsN2) was detected which showed measurable differences in both its haemagglutinin and neuraminidase from those of the other 752 isolates studied, all of which were similar to A/Hong Kong/1/68. Later it was reported that strains similar to A/England/42/72 were responsible for outbreaks of influenza in Southern India in 1971 and elsewhere in the southern hemisphere in 1972.

More recent studies have provided evidence that antibody to A/England/42/72 may result from natural infection or immunisation with the Hong Kong variant or related strains. However, it is not known if this response is consistent enough or of sufficient magnitude to protect against the A/England/42/72 virus should it become the prevalent type in the UK.

(b) *Rhinoviruses.*

The commonest infection with a respiratory virus is with one of the rhinoviruses, of which there are 89 antigenically distinct serotypes recognised at present. There are as yet no practical laboratory methods for testing large numbers of human sera for the presence of antibody to individual rhinoviruses and serotyping remains the only way of determining which strains are infecting the community at a given time. The typing of rhinoviruses is complicated by the fastidious growth requirements of some strains and the scarcity of good specific antisera. For these reasons, all rhinovirus typing is carried out centrally at the VRL, Colindale and strains are sent from peripheral PHLS laboratories and, by special arrangement, from certain hospital laboratories.

Typing of random individual strains is of limited value and continuous sampling of a particular area for a long period is likely to be more profitable. Therefore, most of the rhinoviruses submitted for typing are isolated during the course of various long-term studies among families, schoolchildren, factory workers, and special groups of patients, such as sufferers from chronic bronchitis.

Examination of more than 500 strains of rhinoviruses over the last seven years has confirmed that a large number of serotypes circulate simultaneously in one area, to be replaced within a few months by a similar number of different serotypes. With such a flux of serotypes within the community, any hope of securing protection against infection with rhinoviruses by means of a vaccine seems unrealistic.

Epidemics of respiratory illness in the population at large are seldom associated with rhinovirus infections. However, the results of serotyping strains isolated from family outbreaks indicate that particular serotypes spread from person to person in the close contact of family life.

(c) *Coronaviruses.*

Several collaborative studies of acute respiratory infections by the Service have resulted in a laboratory diagnosis in only one-third of the cases sampled. The use of organ cultures has shown that at least some of the illnesses which yield negative results when examined by the standard methods are the consequence of infection with a fastidious strain of rhinovirus or with a coronavirus. This latter group of viruses derives its name from the club-shaped surface projections possessed by its members. It includes, among others, the viruses of mouse hepatitis and avian infectious bronchitis. The human respiratory coronaviruses are divided into two groups, those resembling 229E virus which can be isolated in, or readily adapted to, tissue culture; and the organ-culture strains which do not and may be detected only by electronmicroscopy or the infection of volunteers. Because of the difficulties associated with the isolation of the agents, only 21 strains of 229E-like virus and nine organ-culture strains have so far been reported in the literature. In one Public Health Laboratory (Cirencester), the use of organ-cultures in the study of acute respiratory illness has led to the first isolations (four strains) of 229E-like virus in this country and to the detection of three further infections with organ-culture coronaviruses (Higgins & Ellis 1973).

Although the number of strains isolated is very small and volunteer experiments have been limited, the evidence suggests that, like rhinoviruses, coronaviruses are usually associated with the common cold, but they may also be isolated from lower respiratory tract infections and patients presenting with an influenza-like illness. Coronavirus infections probably appear in outbreaks, for these agents have been isolated only from illnesses during the winter months when small clusters of infections are observed over a limited period of time.

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Recent Work on Group-A Streptococci

The ability of a group-A streptococcus to invade the human body is thought to depend on the production of a virulence factor—the M antigen, an acid-resistant protein with anti-phagocytic properties. Antibody to this protein is formed in response to infection and gives rise to type-specific immunity. M antigen is detectable by means of a precipitation reaction of type-specific antiserum with an acid extract of the streptococcus. Nearly all naturally occurring group-A streptococci have an M antigen, indicated by their ability to grow in normal human blood, but this often cannot be detected in precipitation tests because the corresponding antiserum is not available.

Until recently, antigenic change in the M protein, other than its loss on subculture, was thought to be a rare event. In 1969, however, Maxted and Valkenburg observed the replacement, in the population of Voorhout in the Netherlands, of streptococci of M-type 12 by strains with a similar T antigen but a different M antigen (M63). This variation was reproduced in the laboratory, and was always accompanied by gain of the ability to cause opacity in horse serum. A similar change of M12 to M22, also with the appearance of a positive serum-opacity reaction (SOR), was demonstrated first in the field and later *in vitro*. This form of variation might enable a streptococcus to spread in a population that has become immunized to its original M antigen. Many mixed outbreaks of type 12 and the type-22 variant have since been observed in Britain, and the variant now appears to be becoming prevalent.

Further work on the SOR has thrown light on why M antisera for many streptococcal types have not been prepared, and has also provided an alternative method of recognising these types. Gooder (1961) observed that a positive SOR was produced mainly by streptococci that could not be M-typed with existing sera, or for which antisera were difficult to prepare even by the prolonged immunisation of rabbits; and Top and Wannamaker (1968) demonstrated the specific inhibition of the SOR by homologous antiserum. These findings were confirmed and extended by Widdowson, Maxted, and Grant (1970) who showed that, in SOR-positive strains in which the M antigen could be identified, the opacity factor was present in the supernate of cultures, or released from the cell by extraction with acid, together with the M antigen; in M-negative variants, on the other hand, it was closely bound to the cell. Opacity factor is present in acid extracts of all members of at least 16 M types, and in many other strains for which no antiserum is available, but is never formed by any member of 32 other M types (Maxted *et al.* 1972). When acid extracts that contain both opacity factor and M protein are purified by fractional precipitation and column chromatography, the factor is closely associated with the high-molecular-weight fraction of the M protein (Widdowson *et al.* 1971a). This, and the fact that the serological specificity of the two antigens corresponds exactly, suggests that they may form part of the same molecular complex.

In some of the " difficult " M types, anti-opacity sera are easier to make than precipitating antisera. Inhibition of opacity thus provides a valuable alternative means of delineating new M types (Maxted *et al.* 1972). Patients infected with SOR-positive serotypes form antibody to opacity factor, and its presence generally parallels that of M antibody (Maxted *et al.* 1973). The inhibition test is a quick and easy method of studying the antibody response to infection with about one-third of the M types. Human sera may also be used to recognise new M types; a strain responsible for impetigo in a mental institution has recently been identified by means of opacity inhibition tests with the serum of a convalescent patient (Maxted and Barrow, *unpublished*).

In studies of the presence of opacity factor and M antigen in subcellular fractions of streptococci, it is observed that, in the blood of some donors, the bactericidal action on M-positive streptococci in the presence of homologous antiserum was neutralised by extracts of streptococci of heterologous types. This led to the identification of a streptococcal antigen (M-associated protein: MAP), which is present in all M-negative strains and is not type specific; it is detected in a complement-fixation test with certain human sera and an acid extract of any M-positive streptococcus (Widdowson *et al.* 1971b). Attempts to separate MAP from M antigen by physico-chemical means resulted in a parallel purification of both, but when suspensions of streptococci of some serotypes were treated with purified streptococcal proteinase and subsequently with acid, MAP was collected free from M antigen (Maxted and Widdowson 1972).

Antibody to MAP is formed as a result of some infection with group-A streptococci. Titres are almost invariably high in rheumatic fever, very much lower in post-streptococcal glomerulonephritis, and variable in infections of the upper respiratory tract (Widdowson *et al.* 1971b). In studies of the antibody response in outbreaks of tonsillitis in residential institutions in Britain, the production of antibody to MAP and to M antigen did not run parallel with the production of antibody to extracellular products such as streptolysis O and DNAase B. Infection with SOR-negative types, such as M5 and M18, caused a much greater antibody response both to MAP and to M antigen than did infection with SOR-positive types, such as M22 and M58 (Widdowson, Maxted, Notley and Pinney, *unpublished*). The antibody response to these cellular protein antigens of SOR-positive streptococci thus appears to be poor in man as well as in the rabbit. In two outbreaks due to SOR-negative serotypes, in which cases of rheumatic fever appeared, a large proportion of patients who suffered from uncomplicated tonsillitis formed antibody to MAP and to M antigen. These findings provided some support for the unfashionable view that streptococcal strains vary in theumatogenicity, and suggest that this character may be associated with the ability of cellular protein antigens to elicit an antibody response.

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Human Immunoglobulin

The Public Health Laboratory Service is responsible, on behalf of the Department of Health and Social Security, for the issue of much of the human immunoglobulin used in England, Wales and Northern Ireland. (In Scotland immunoglobulin is distributed by the Blood Transfusion Service and Medical Officers of Health).

Human immunoglobulin is prepared in two forms:

(1) Normal human immunoglobulin—from the pooled plasma of a large number of donors. The material should contain antibodies against those diseases naturally prevalent in the population from which the plasma is drawn. It is used to provide broad-spectrum protection in hypogammaglobulinaemia, and as a source of certain specific antibodies—for example for prophylaxis of infectious hepatitis and measles.
The amount of normal immunoglobulin issued by the P.H.L.S. in recent years has been about 47,000 annually. Of this approximately one-third has been issued for rubella prophylaxis and another third for the prevention of infectious hepatitis. About 4 per cent is issued for the attenuation or prevention of measles.

(2) Specific human immunoglobulin—containing antibodies against a specified disease or antigen, usually in high concentration. Plasma rich in a particular antibody may be secured by collecting a blood donation from convalescent patients (*e.g.* anti-varicella-zoster immunoglobulin); from persons who naturally possess a high concentration of a particular antibody (*e.g.* anti-D); from recently vaccinated persons (*e.g.* anti-vaccinia); or sometimes by immunising volunteer donors, when plasmapheresis may be used to ensure a high yield of plasma (*e.g.* tetanus antitoxin in the U.S.A.).

The main specific preparation with which the P.H.L.S. is concerned is anti-vaccinia immunoglobulin, of which about 200 doses are issued annually.

The immunoglobulin which is not dealt with by the P.H.L.S. comprises that used for the treatment of hypogammaglobulinaemia, human tetanus antitoxin, and anti-D immunoglobulin, together with that which is produced and sold commercially.

Preparation and Control Procedures.

The immunoglobulin issued by the P.H.L.S. is produced mainly by the Blood Products Laboratory of the Lister Institute of Preventive Medicine. A small quantity is imported. Human plasma is fractionated using the cold ethanol procedure to give a product in which the IgG content of the original plasma is concentrated about 20 times. The material is issued as a 14-16 per cent solution and 1 ml. may provide the antibody equivalent of as much as 20 ml. of plasma. The product is free from the risk of transmitting hepatitis. The World Health Organisation's recommendations concerning production methods and quality control of immunoglobulin are met for all human immunoglobulin released in the United Kingdom.

Production of normal immunoglobulin from outdated blood presents no insuperable difficulties at the present time and in order to meet all foreseeable demands the Blood Transfusion Service is expanding its facilities for fractionation. Nevertheless, as with all blood products, immunoglobulin should be used only when there is a valid indication. Provision of adequate supplies of the specific immunoglobulins is not always straightforward, and it is possible that a number of the preparations will be in short supply for some years to come. The Blood Transfusion Service is always prepared to collect a donation from suitable persons—that is, from patients who have recovered from chickenpox, herpes zoster, or mumps within the previous three months, from individuals who have been revaccinated against smallpox within the previous three weeks, and from persons who 21 to 28 days previously have had a booster dose of tetanus toxoid.

The Use of Human Immunoglobulin

The usage of human immunoglobulin with which the P.H.L.S. is concerned is summarised in the accompanying table. The doses given in the table, and the degree of effectiveness indicated, are liable to be changed as fresh information is accumulated. In general, protection is best given when immunoglobulin may be injected before exposure, as for example for travellers who may be exposed to infectious hepatitis. When this is not possible, the sooner after exposure that the material is injected the better.

Immunoglobulin should be injected intramuscularly, the standard preparation being unsuitable for intravenous use. The volume to be injected is sometimes large and it may then be necessary to split the injection between two or more sites. Immunoglobulin should be stored at between 2°C and 10°C and should not be frozen. Ampoules should not be kept in a warm atmosphere, but it is unlikely that there would be any appreciable deterioration during a week at room temperature or, for example, in the post over a weekend.

Normal human immunoglobulin

At present dispensed usually in ampoules containing 250 mgm in 1·6 ml or 750 mgm in 5·1 ml

Indication	Effectiveness	Dosage		Comment
Measles: prevention in contacts with no previous history of measles and who are at special risk, *e.g.* children with active tuberculosis, or malignant disease; immunosuppressive therapy.	Effective. Given within five days of exposure.	Under 1 yr. 1–2 yr. 3 yr. and over	250 mgm 500 mgm 750 mgm	Active immunisation should if possible be carried out three months later. To prevent side effects it may be necessary to inject a small dose of immunoglobulin with the vaccine but at a separate site—dose 0·6 mgm per lb. body weight. Low dose preparations are held for this purpose by Medical Officers of Health.
Measles: attenuation in those at special risk, *e.g.* children with chronic chest disease.	Effective. Given within five days of exposure. A mild clinical infection should result with the development of active immunity.	All ages over 1 yr.	250 mgm	Measles vaccines should reduce much of this requirement for immunoglobulin.
Infectious hepatitis: prophylaxis, *e.g.* travellers to countries where the disease is endemic; institutional outbreaks.	If given before exposure, or up to two weeks afterwards, should prevent clinical disease in about 85% of contacts. The prophylactic effect lasts about three to six months. Effect declines up to six weeks after exposure, after which time it is no longer believed to be of prophylactic value.	Children under 10 yr. Adults and children of 10 yr. and over	250 mgm 500 mgm	May allow the development of active immunity as a consequence of subclinical infection. No therapeutic activity has been found. Probably no activity against serum hepatitis.
Rubella: prevention in exposed pregnant women.	Probably does not prevent infection when given *after* exposure to a florid case of german measles, but may prevent clinical manifestations.	750 mgm as early as possible after exposure.		Only recommended when the patient will not consider a therapeutic abortion. Serological tests for immunity should be done—over 80% of women possess antibodies and would not be at risk, and not all " exposed " patients become infected.

Varicella: attenuation in persons at special risk, *e.g.* ill or eczematous children. (a) newborn; pregnant women; patients on low steroid doses. (b) blood dyscrasia; high steroid dosage: cytotoxic drug therapy. (c)	Attenuation of the disease should result when given within three days exposure.	Newborn 250 mgm Under 1 yr. 500–750 mgm 1–6 yr. 1000–1500 mgm 7 yr. and over: 1500 mgm group (a) 2250–4000 mgm group (b) 4500–8000 mgm group (c) patients	Specific anti-varicella immunoglobulin is sometimes available for patients at special risk (see below).
Other conditions where immunity and resistance may be impaired—in order to prevent bacterial and/or virus infections generally, *e.g.* burns, immunosuppression, prematurity.	Doubtful.	Speculative; possibly 1500 mgm for adults, repeated if necessary.	The present evidence is not sufficient to recommend use of human IgG in these conditions. Further controlled experimental work is needed.

Note: For patients with hypogammaglobulinaemia the supply of normal immunoglobulin is dealt with at Northwick Park Hospital and the East Birmingham Hospital.

Specific human immunoglobulin

Preparation	Indication	Effectiveness	Dosage	Comment
Anti-Australia antigen (from plasma naturally containing antibody to the antigen).	Prophylaxis of hepatitis, *e.g.* medical staff accidentally injured by a needle contaminated with blood containing Au antigen.	Early studies suggest may be of some value.	Not certain.	The material is under study and is not yet generally available.
Anti-mumps (at present from convalescent patients).	Prophylaxis in exposed high-risk patients, *e.g.* those with leukaemia.	Large doses may have some effect in preventing mumps, or in preventing orchitis in patients with parotitis, but evidence at present is conflicting.	Under 1 yr. 500 mgm 1–6 yr. 1000 mgm 7 yr. and over 1500 mgm	More studies are needed. The material is in very short supply. Normal immunoglobulin is not believed to have any effect.
Anti-tetanus (from donors recently boosted with tetanus toxoid).	(1) Prophylaxis in wounded patients who have not been actively immunised.	Probably very effective.	250 units.	Not supplied by P.H.L.S. Obtained from special centres listed in the D.H.S.S. Memorandum HM(70)37. Certain of these centres are Public Health Laboratories. At present in short supply and therefore used mainly in patients hypersensitive to horse antitoxin.
	(2) Treatment of tetanus.	Possibly of value.	10,000 units.	Use restricted to patients susceptible to heterologous antiserum.
Anti-vaccinia (from recently re-vaccinated donors).	*For prophylaxis:* (1) To prevent complications when vaccination is necessary in the presence of contra-indications, *e.g.* eczema; steroid therapy; patients with marked allergic tendencies; elderly persons.	Probably effective.	Under 1 yr. 500 mgm 1–6 yr. 1000 mgm 7–14 yr. 1500 mgm 15 yr. and over 2000 mgm	Given at the same time as vaccination, but in a different limb.
	(2) In unvaccinated persons exposed to smallpox.		As above.	Of most value in unvaccinated exposed persons who are first seen late in the incubation period, when vaccination alone would be insufficiently protective. Should be accompanied by vaccination.

	Treatment of: (3) Generalised vaccinia; progressive vaccinia; eczema vaccinatum.	Probably of value.	As above; repeat in two days if necessary.	No evidence of value in *treatment* of post-vaccinial encephalitis.
	(4) Vaccinial lesion of eye.	Probably effective.	As above, plus local installation of 1% solution in sterile saline half-hourly. (Dilute with 14 volumes of sterile saline.)	*Note:* Herpes simplex infection may cause similar manifestations.
Anti-varicella-zoster (from patients convalescent from either condition).	Prophylaxis in exposed high-risk persons, *e.g.* children on large doses of steroids.	Probably of value when given within 72 hours of exposure, but the information so far available is limited.	Under 1 yr. 500 mgm 1–6 yr. 1000 mgm 7 yr. and over 1500 mgm	Rarely available at present. Normal immunoglobulin may be used (see above). Role in *treatment* of varicella-zoster (as in patients with Hodgkin's disease) requires study.

Note: Anti-D immunoglobulin is provided by Regional Blood Transfusion Centres.

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The Identification of Mycobacteria in Service Laboratories.

A diagnostic service must clearly make provision for the identification of mycobacteria isolated by culture. The first step is a screening procedure to distinguish between tubercle bacilli and opportunist mycobacteria and its importance requires the aim of complete efficiency. Screening may be followed by classification to group, species, or even type level, but the extent of this will normally be set by a compromise between the expense and delay incurred, and the benefit to be expected.

Screening.

No single test is fully effective. A combination of tests is recommended, *viz.* the following subcultures from a suspension on Lowenstein-Jensen medium (in the dark and at 37°C unless otherwise stated):

(1) a plain slope incubated in light;
(2) a plain slope incubated at 25°C;
(3) a slope containing *p*-nitrobenzoic acid, 500 g/ml.

A further slope containing thiacetazone (10 g/ml) is helpful although not essential. In addition, a film of the primary isolate should be stained by the Ziehl-Neelsen method to examine morphology and check purity and the primary culture should be re-incubated in light to disclose photochromogenicity. Finally, routine tests against the major anti-tuberculosis drugs are a valuable safeguard against error since tubercle bacilli almost always respond characteristically.

Classification.

A gap has developed between the advances made in academic taxonomy and the needs of the service laboratory for a useful but simple classification. A new scheme has therefore been prepared which takes advantage of recent progress but proceeds no further than will benefit the patient's management. It is not designed for epidemiological studies which usually need more detail.

The classification is based primarily on temperature requirements and mycobacteria are alloted to defined categories according to their growth at 25°C, 37°C and 45°C. An additional test is made at 42°C to provide supporting evidence. Secondary divisions are then made on the basis of pigmentation and oxygen preference. The latter was initially determined by observing the character of growth in semi-solid agar medium. This remains the procedure for distinguishing between *M.tuberculosis* and *M.bovis*. With opportunists, however, advantage is normally taken of the general rule that aerobes give heaped-up (eugonic) growth on Lowenstein-Jensen medium and microaerophiles give effuse (dysgonic) growth. An intermediate status is sometimes recognised. Most sectors of the classification can derive confirmatory support from drug-sensitivity tests and in some cases also from the Tween-hydrolysis test (Marks 1972).

The above is a summary of a paper given at the 1972 international colloquium of the Prince Leopold Institute of Tropical Medicine, Antwerp, dealing with " The Genus Mycobacterium ", the proceedings of which will be published in 1973. Included in these will be Dr. Marks' paper (with P. A. Jenkins) on the contribution of lipid analysis to mycobacterial taxonomy.

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Vibrio parahaemolyticus: *a " new " pathogen from the sea*

Great quantities of sea-foods are consumed annually throughout the world, yet little attention appears to have been paid to marine bacteria as a possible cause of illness in man.[1] One such organism, *Vibrio parahaemolyticus*, was identified in Japan, where it is now recognised as the commonest cause of food-poisoning in summer, due largely to the national custom of eating raw and processed fish products. Although this halophilic, Gram-negative, non-sporing marine organism was first described some 20 years ago, most of the early and much of the subsequent work was published in Japanese. Consequently, this interesting microbe remained virtually unknown elsewhere until comparatively recently.

At first, it was thought to be confined to Japan and the Far East, but it has now been isolated in many countries, including Britain, from numerous marine sources and sea-foods, particularly crabmeat, shellfish, prawns, shrimps, and other crustacea.[2] *V. parahaemolyticus* has also been identified as the cause of outbreaks of gastroenteritis associated with sea-foods in Australia[3], and the U.S.A.[4] It has been isolated from infected skin lesions in bathers and fish handlers. It is almost certainly widely distributed throughout the world, especially in warm coastal waters where it probably exists as a free-living organism.

Clinically, illness caused by *Vibrio parahaemolyticus* varies from acute gastroenteritis of sudden onset, usually accompanied by severe abdominal pain, to mild diarrhoea. The average incubation period is 12-24 hours, but ranges from 2-48 hours depending partly on the infecting dose, the type of food, and the acidity of the stomach. It is an infection in that the organisms multiply rapidly in the gut, but is self limiting, generally lasting only a few days. As in cholera, *V. parahaemolyticus* is excreted in large numbers during illness, but decreases rapidly in number with clinical recovery. Specimens from suspected cases should therefore be examined as soon as possible. Since vibrios grow well, forming large nondescript colonies on ordinary nutrient media and non-lactose fermenting colonies on MacConkey agar, it is essential to use selective techniques for isolation. Indeed, with the spread of the El Tor cholera vibrio and cholera infection among travellers, it is fortunate that *V. parahaemolyticus* may be isolated by the same media and method as those used for cholera organisms. Specimens should therefore be inoculated directly on to thiosulphate-citrate bile-salt sucrose (TCBS) agar as well as into enrichment media selective from vibrios. *V. parahaemolyticus* forms large characteristic green colonies after overnight incubation on TCBS medium in contrast to the yellow sucrose-fermenting colonies of *V. cholerae*. Whatever methods are used, however, any Gram-negative organisms which are motile, oxidase- and catalase-positive and sensitive to methylene blue and vibriostatic agent 0/129 should be regarded as vibrios and further identified. If this is done as a routine, infection with non-cholera vibrios, including *V. parahaemolyticus*, might be recognised more often, but unless they are specifically sought, specimens may well be reported as negative for intestinal pathogens.[5]

All strains of *V. parahaemolyticus* have identical H antigens, but they may be differentiated serologically, like salmonellae, into different types by agglutination tests with specific O and K antisera. Certain serotypes seem to cause illness more frequently than others. Whatever the serotype, however, most strains isolated from patients produce β-lysis of human blood in an agar medium—referred to as the Kanagawa test—whereas the majority of strains from marine sources are Kanagawa-negative.[6] This accords with the results of limited feeding tests on human volunteers: only Kanagawa-positive strains induced illness, whereas Kanagawa-negative strains failed to do so. The reasons for this are not yet known, but despite some exceptions, the Kanagawa reaction nonetheless seems to distinguish between potentially virulent and non-pathogenic strains.

Epidemiologically, infection with *V. parahaemolyticus* is almost invariably food-borne, mainly from marine products, although there may be cross-contamination of other foods. Spread of infection from one person to another does not seem to be important, and the significance of possible carriers is uncertain. The infective dose needed to cause illness is probably fairly large, but as this organism can multiply quickly, even at room temperature, only a short time is necessary for the production of hazardous numbers. Since they are sensitive to heat, marine bacteria should perhaps be used as a further indication of the cleanliness of sea-foods, although safety usually depends not so much on microbiological standards as on hygienic production and correct storage.

Although the presence of *V. parahaemolyticus* has been confirmed in home-produced sea-foods and British coastal waters, its significance as an endemic cause of illness is not yet known. For the first time, however, infection with this organism has now been recognised in Britain among airline passengers and crew returning from Bangkok to London.[7] The food concerned was cooked crabmeat in *hors d'oeuvres* prepared at Bangkok. At least 12 of 134 persons at risk suffered from acute gastroenteritis, and it is probable that many of the other passengers who could not be traced were also affected.

V. parahaemolyticus may be imported not only by travellers but also commercially in sea-foods. Such imports often contain large numbers of marine bacteria, which, in cooked products, indicate poor hygiene during processing. With the vast, expanding trade in frozen and processed sea-foods, medical and food microbiologists should therefore be aware of this organism. Indeed, it has already been isolated from many samples of imported marine products. It certainly must not be ignored, for it may yet prove to be a real hazard if sought in all cases or outbreaks of gastroenteritis in travellers or in persons who have recently eaten sea-foods. Much interesting and rewarding work remains to be done on this " new " pathogen from the sea.

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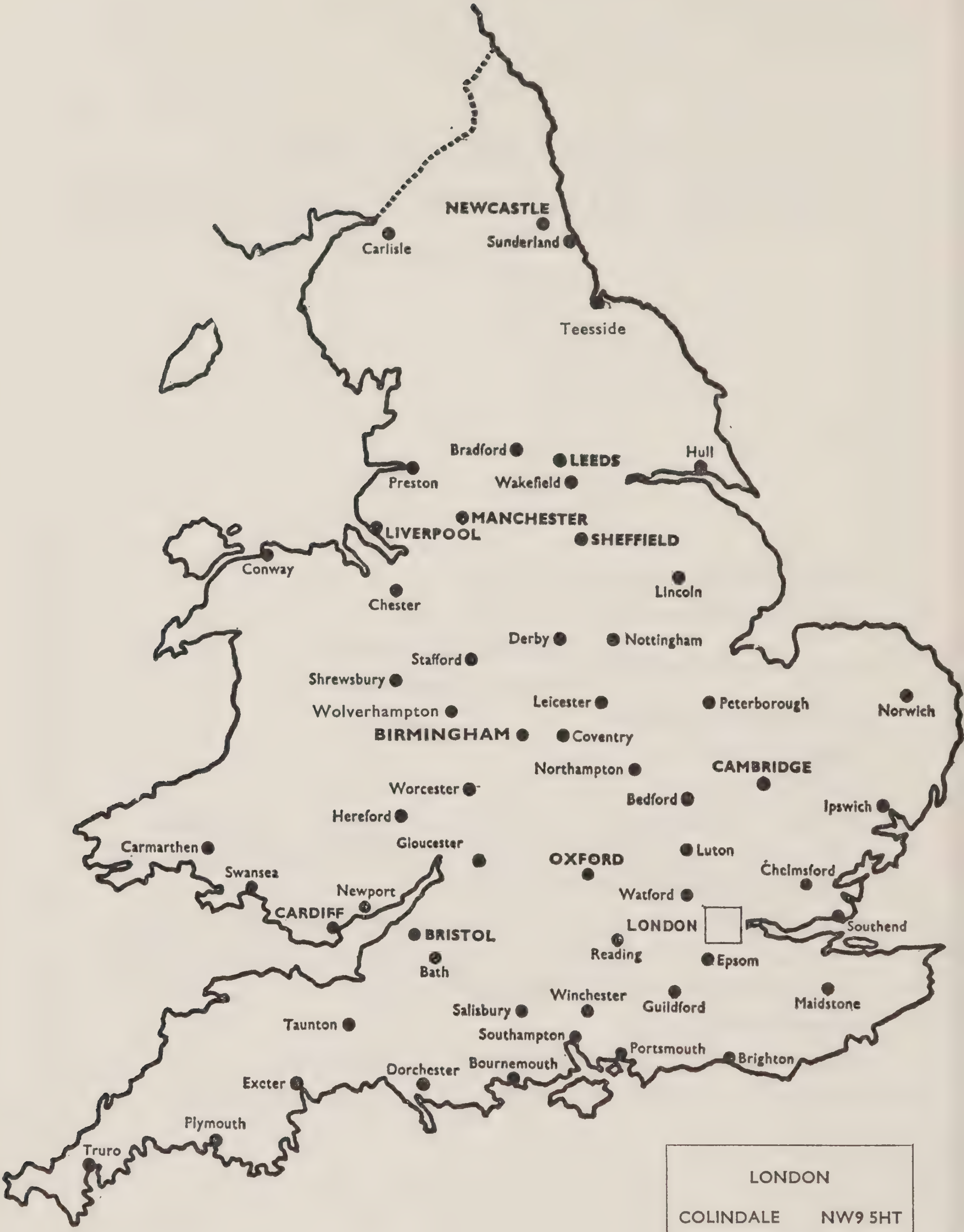

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I. R. Ferguson, M.B., M.R.C.S.
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MIDDLESBROUGH:

Middlesbrough is now part of the County Borough of Teesside, and in future will be listed as TEESSIDE

NEWPORT (Mon.):

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G. H. Lowe, F.I.M.L.T. (*Technical Officer:* holder of collection of type cultures of *Trichomonads*)

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*From 1st April 1973 the Sunderland Laboratory will be administered by the Public Health Laboratory Service Board on behalf of the Newcastle Regional Hospital Board.

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M. B. Skirrow, M.B., Ph.D., M.R.C.Path., D.T.M. & H.

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These Laboratories normally receive specimens only from other laboratories within or without the Service.

CROSS-INFECTION REFERENCE LABORATORY:

(*incorporating the Staphylococcus and Streptococcus Reference Laboratories*):

Central Public Health Laboratory,
Colindale Avenue, London,
NW9 5HT
Tel.: 01-205 7041

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Mrs. Elizabeth A. Hall Asheshov, Ph.D., M.R.C.Path., Dip.Bact.
Mrs. Brenda M. Brock, B.Sc.
†D. F. J. Brown, B.Sc.
A. W. Coe (*Head Technician*)
M. A. Curtis, B.Sc.
*N. Foord, B.Sc.
*O. M. Lidwell, D.Phil. (*Deputy Director*)
*R. R. Marples, B.M., M.Sc., M.R.C.Path. (*from* 1*st April* 1973)
W. R. Maxted, Hon. Dr. (Leiden), M.I.Biol., F.I.M.L.T.
Mrs. Alison M. Pinney, B.Pharm.
Mrs. Adeline G. Towers, B.Sc., M.B., M.R.C.Path. (*part-time*)
Mrs. Jean P. Widdowson, B.Pharm., Ph.D., M.P.S.

ENTERIC REFERENCE LABORATORY:

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J. D. H. de Sa, M.Sc., Ph.D.
F. J. Flynn (*Head Technician*)
Mrs. June N. Grindley, B.Sc.
N. D. F. Grindley, B.A.
C. S. Heymann, M.B., M.R.C.Path., D.P.H., D.T.M.& H., Dip.Bact.
G. O. Humphreys, B.Sc., Ph.D.
H. R. Smith, B.A.
E. J. Threlfall, B.Sc., Ph.D.
Mrs. Linda R. Ward, B.Sc.
Miss Jennifer A. Weaver, M.Sc.

DISINFECTION REFERENCE LABORATORY:

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Colindale Avenue, London,
NW9 5HT
Tel.: 01-205 7041

J. C. Kelsey, M.D., F.R.C.Path., Dip.Bact. (*Director*)
Mrs. Isobel M. Maurer, B.Sc.

LEPTOSPIROSIS REFERENCE LABORATORY:

London School of Hygiene and Tropical Medicine, Keppel Street,
London, WC1E 7HT
Tel.: 01-636 8636

L. H. Turner, M.B.E., M.D., D.T.M. & H. (*Director*)
G. McGimpsey, F.I.M.L.T. (*Head Technician*)

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† At Clinical Research Centre, Northwick Park Hospital

MYCOLOGICAL REFERENCE LABORATORY:

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Miss Christine M. Philpot, B.Sc.
A. G. J. Proctor, T.D., B.D., F.I.M.L.T.

MYCOPLASMA REFERENCE LABORATORY:

Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT
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R. A. Hewish, F.I.M.L.T. (*Head Technician*)
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SALMONELLA AND SHIGELLA REFERENCE LABORATORY:

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Miss Christine R. Cattran, B.A.
Miss Kathryn A. Forshaw, B.Sc., Ph.D.
R. J. Gross, M.A., M.I.Biol.
Miss Margaret Guiney, B.Sc.
Mrs. Mary L. M. Hall, B.Sc.
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TUBERCULOSIS REFERENCE LABORATORY:

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VENEREAL DISEASE REFERENCE LABORATORY:

London Hospital Research Laboratories, Ashfield Street, London, E1 2BL
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VIRUS REFERENCE LABORATORY:

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Miss Anne M. Field, B.Sc., Ph.D.
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Mrs. E. Valerie Meurisse, M.Sc.
F. G. Rodgers, B.Sc.
Mrs. Mary O. Roebuck, M.B., Dip.Bact. (*part-time*)
Mrs. Elise M. Vandervelde, M.B., Dip.Bact.

Note: With the exception of smallpox and related virus diseases, rabies and the serology of typhus fever, the Virus Reference Laboratory does not receive specimens for routine diagnosis. Such specimens are received at all regional and most area laboratories and enquiries should be directed to the nearest P.H.L.S. laboratory.

COMPUTER TRIALS DEPARTMENT:

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EPIDEMIOLOGICAL RESEARCH LABORATORY:

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J. A. Lee, M.B., D.P.H.
Miss Christine L. Miller (Mrs. Manning), B.M. (*part-time*)
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NATIONAL COLLECTION OF TYPE CULTURES:

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K. D. Phillips, B.Sc.
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STANDARDS LABORATORY FOR SEROLOGICAL REAGENTS:

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Mrs. Mabel W. Dighero, B.Sc.
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Mrs. Agnes J. Macara, B.Sc.
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*Shared with the London School of Hygiene and Tropical Medicine.

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(*Attending course at the London School of Hygiene and Tropical Medicine for Diploma in Bacteriology*)

1972-73

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Miss Audrey J. E. Flower, M.B., D.C.H.
D. H. M. Joynson, M.B., M.R.C.P.
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HOSPITAL PATHOLOGICAL LABORATORIES DESIGNATED "RECOGNISED"

at which arrangements are made for the examination of public health specimens for the Service

AYLESBURY
Stoke Mandeville Hospital, Aylesbury, Buckinghamshire.
BOLTON
Royal Infirmary, Bolton, Lancashire.
WIGAN
Royal Infirmary, Wigan, Lancashire.

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Bacteriology Laboratory, Doncaster Royal Infirmary, Doncaster, Yorkshire.
Tel.: Doncaster (STD 0302) 66666.

S. W. B. NEWSOM, M.A., M.B., M.R.C.Path., D.T.M. & H.
Simms Woodhead Memorial Laboratory, Papworth Hospital, Papworth Everard, Cambridge.
Tel.: Papworth St. Agnes (STD 048 088) 371, *Ext.* 233.

M. W. B. NICHOLLS, M.B., M.R.C.S., M.R.C.Path.
Department of Pathology, St. Richard's Hospital, Chichester.
Tel.: Chichester (STD 0243) 82671.

J. H. PENNINGTON, M.A., M.D., M.R.C.Path. (*See p.* 35.)
Department of Microbiology, Clatterbridge Hospital, Bebbington, Cheshire, L63 4JY.
Tel.: 051-334 4000.

N. W. PRESTON, M.D., F.R.C.Path., Dp. Bact.
Department of Bacteriology and Virology, University of Manchester, Williamson Building, Brunswick Street, Manchester, M13 9PL.
Tel.: 061-273 3333.

D. S. REEVES, M.B., M.R.C.S., M.R.C.Path.
Department of Microbiology, Southmead Hospital, Westbury-on-Trym, Bristol, BS10 5NB.
Tel.: Bristol (STD 0272) 62-2821.

J. B. SELKON, M.B., M.R.C.Path., D.C.P. (*See* p. 33.)
Department of Microbiology, Institute of Pathology, General Hospital, Westgate Road, Newcastle upon Tyne, NE4 6BE. *Tel.:* Newcastle (STD 0632) 3881.

M. SEVERN, M.B., M.R.C.Path. (*See p.* 38.)
Department of Microbiology, General Hospital, Northampton, NN1 5BD.
Tel.: Northampton (STD 0604) 34700.

T. N. STANBRIDGE, M.B., M.R.C.S., Dip.Bact.
Department of Medical Microbiology, The Welsh National School of Medicine, Heath Park, Cardiff, CF4 4XN. *Tel.:* Cardiff (STD 0222) 755944.

J. M. STARK, M.D., M.R.C.Path., D.Path.
Department of Medical Microbiology, The Welsh National School of Medicine, Heath Park, Cardiff, CF4 4XN.
Tel.: Cardiff (STD 0222) 755944.

M. SUSSMAN, B Sc., Ph.D., M.I.Biol.
Department of Medical Microbiology, The Welsh National School of Medicine, Heath Park, Cardiff, CF4 4XN.
Tel.: Cardiff (STD 0222) 755944

J. M. TALBOT, M.D., M.R.C.Path., Dip.Bact.
Department of Pathology, Kingston Hospital, 37 Coombe Road, Kingston upon Thames, Surrey.
Tel.: 01-546 7711.

W. R. G. THOMAS, M.B., M.R.C.S., M.R.C.Path., D.T.M. & H., Dip.Bact.
Bacteriology Laboratory, Mayday Hospital, Mayday Road, Thornton Heath, Surrey CR4 7YE.
Tel.: 01-684 6999.

Professor SCOTT THOMSON, M.D., F.R.C.P.E., F.R.C.Path., D.P.H.
Department of Medical Microbiology, The Welsh National School of Medicine, Heath Park, Cardiff, CF4 4XN. *Tel.:* Cardiff (STD 0222) 755944.

D. C. TURK, D.M., M.R.C.P., M.R.C.Path.
Department of Bacteriology, Radcliffe Infirmary, Oxford. *Tel.:* Oxford (STD 0865) 49891.

Mrs. BETTY E. WALLACE, M.A., M.D., F.R.C.Path., B.A.O.
Department of Clinical Microbiology, Royal Sussex County Hospital, Brighton, BN2 5BE.
Tel.: Brighton (STD 0273) 66611.

R. FRASER WILLIAMS, M.B., M.R.C.Path.
Department of Pathology, Monsall Hospital, Newton Heath, Manchester, M10 8WR.
Tel.: 061-205 2254.

REFERENCE EXPERTS

In the following list the name of the expert who is responsible for the relevant examination is given. Reference experts normally receive specimens only from other laboratories within and without the Service. It should be added, however, that all regional and most area laboratories are undertaking the routine diagnosis of virus infections, the serological diagnosis of leptospiral infections, and the bacteriophage-typing of strains of *Staphylococcus aureus*. For this reason enquiries on these subjects should usually be addressed to the local public health laboratory.

Amoebiasis, diagnosis of

A. L. Jeanes, M.D., F.R.C.Path., Department of Medical Microbiology, Guy's Hospital, London, S.E.1. *Tel.:* 01-407 7600, *Ext.* 578.

Anaerobes, identification

A. T. Willis, M.D., D.Sc., Ph.D., M.R.A.C.P., M.R.C.Path., F.R.C.P.A., Public Health Laboratory, Luton and Dunstable Hospital, Lewsey Road, Luton, LU4 0DZ. *Tel.:* Luton (STD 0582) 52007.

Anthrax bacilli, identification

Miss Joan R. Davies, M.D., Dip.Bact. Public Health Laboratory, St. Luke's Hospital, Guildford. *Tel.:* Guildford (STD 0483) 66091

Anthrax, examination under Wool and Hair Regulations

T. F. Elias-Jones, M.B., F.R.C.Path., The City Laboratory, 23 Montrose Street, Glasgow, G1 1RN. *Tel.:* 041-221 9600 and 4348, *Ext.* 2400.

Miss Joan R. Davies, M.D., Dip. Bact. Public Health Laboratory, St. Luke's Hospital, Guildford. *Tel.:* Guildford (STD 0483) 66091.

G. C. Turner, M.D., F.R.C.Path., Public Health Laboratory, Fazakerley Hospital, Lower Lane, Liverpool, L9 7AL. *Tel.:* 051-525 2323.

Arboviruses

J. S. Porterfield, M.D., M.R.C.S., L.R.C.P., National Institute for Medical Research, Mill Hill, London, NW7 1AA. *Tel.:* 01-959 3666.

Arizona group, identification

B. Rowe, M.A., M.B., D.T.M.&H., Salmonella and Shigella Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Tel.: 01-205 7041.

Blood, tissues and intestinal protazoa, including malaria

Professor W. H. R. Lumsden, D.Sc., M.B., F.R.C.P.E., D.T.M., D.T.H., F.R.S.E., Department of Medical Protozoology, London School of Hygiene and Tropical Medicine, Keppel Street, London, WC1E 7HT. *Tel.:* 01-636 8636.

Brucella, identification

D. J. H. Payne, M.B., F.R.C.Path., M.R.C.P., Dip.Bact., Public Health Laboratory, St. Mary's General Hospital, East Wing, Milton Road, Portsmouth, PO3 6AQ. *Tel.:* Portsmouth (STD 0705) 22331.

Cholera and related vibrios, Aeromonas, and Plesiomonas

A. L. Furniss, M.D., Dip.Bact., Public Health Laboratory, Preston Hall, Maidstone, Kent, ME20 7NH. *Tel.:* Maidstone (STD 0622) 77155.

Additional Reference Expert for *Vibrio Cholerae*

P. Cavanagh, M.A., M.D., B.A.O., Dip.Bact., Public Health Laboratory, Martin Street, Stafford. *Tel.:* Stafford (STD 0785) 54377.

Clostridium welchii, serological typing

Miss Betty C. Hobbs, O.St.J., D.Sc., F.R.C.Path., Dip.Bact., Food Hygiene Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Coxsackie A viruses

D. R. Gamble, M.B., M.R.C.Path., Dip.Bact., Public Health Laboratory, West Park Hospital, Epsom. *Tel.:* Epsom 01-78 26633.

Cytomegaloviruses

Professor H. Stern, M.B., Ph.D., F.R.C.Path., Virus Department, St. George's Hospital Medical School, Hyde Park Corner, London, S.W.1.
Tel: 01-235 5835.

Regional Centres for Cytomegaloviruses Complement Fixation Tests

Bristol: Suzanne K. R. Clarke, M.D., M.R.C.Path., Public Health Laboratory, Myrtle Road, Kingsdown, Bristol, BS2 8EL. *Tel.:* Bristol (STD 0272) 21326.

Leeds: M. H. Hambling, M.D., M.R.C.Path., D.(Obst.)R.C.O.G., Dip.Bact., Public Health Laboratory, Bridle Path, York Road, Leeds, LS15 7TR.
Tel.: Leeds (STD 0532) 645011.

Manchester: J. O'H. Tobin, B.M., F.R.C.Path., M.R.C.P., Dp. Bact., Public Health Laboratory, Withington Hospital, Manchester, M20 8LR.
Tel.: 061-445 2416.

Virus Reference Laboratory: Miss Sylvia D. Gardner, M.B., M.R.C.Path., Dip.Bact., Virus Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Diphtheria bacilli, identification of

Professor M. G. McEntegart, M.D., F.R.C.Path., Department of Medical Microbiology, The University of Sheffield, Sheffield, S10 2TN.
Tel.: Sheffield (STD 0743) 78555.

J. M. S. Dixon, M.D., F.R.C.P.(C), F.R.C.Path., Dip.Bact., Provincial Laboratory of Public Health, University of Alberta, Edmonton, Alberta, Canada, T6G 2J2.

Disinfection

J. C. Kelsey, M.D., F.R.C.Path., Dip.Bact., Disinfection Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Drug Resistance in Enterobacteria

Professor E. S. Anderson, M.D., F.R.C.Path., Dip.Bact., F.R.S., Enteric Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel:* 01-205 7041

Enteric Fever

(*a*) Serological investigation of suspected cases and carriers.
(*b*) Phage-type and ecological study of strains of typhoid and paratyphoid bacilli, and of *Salmonella typhimurium* and certain other salmonella serotypes.

Professor E. S. Anderson, M.D., F.R.C.Path., Dip.Bact., F.R.S., Enteric Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel:* 01-205 7041.

Entomological specimens, investigation

B. R. Laurence, Ph.D., Department of Entomology, London School of Hygiene and Tropical Medicine, Keppel Street, London, WC1E 7HT.
Tel.: 01-636 8636.

Escherichia coli, typing

B. Rowe, M.A., M.B., D.T.M.&H., Salmonella and Shigella Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Farmer's lung, serological diagnosis

Mycological Reference Laboratory, London School of Hygiene and Tropical Medicine, Keppel Street, London, WC1E 7HT. *Tel.:* 01-636 8636.

D. G. Davies, M.D., F.R.C.Path., Dip.Bact., Public Health Laboratory, Cumberland Infirmary, Carlisle. *Tel.:* Carlisle (STD 0228) 23654

J. E. Jameson, M.R.C.S. Public Health Laboratory, Royal Sussex County Hospital, Brighton, BN2 5BE (*to* 12*th July* 1973). *Tel:* Brighton (STD 0273) 63506.

B. Moore, M.D., B.Sc., F.R.C.Path., Public Health Laboratory, Church Lane, Heavitree, Exeter, EX2 5AD. *Tel.:* Exeter (STD 0392) 51251.

H. D. S. Morgan, M.R.C.S., F.R.C.Path., Dip.Bact., Public Health Laboratory West Wales General Hospital, Glangwili, Carmarthen.
Tel.: Carmarthen (STD 0267) 7271.

M. Sussman, B.Sc., Ph.D., M.I.Biol., Department of Medical Microbiology, The Welsh National School of Medicine, Heath Park, Cardiff, CF4 4XN.
Tel.: Cardiff (STD 0222) 755944.

D. M. Weir, M.D., Immunology Laboratory, Department of Bacteriology, Edinburgh University Medical School, Teviot Place, Edinburgh.
Tel.: 031-667 1011, *Ext.* 2256

*Food Poisoning**

Miss Betty C. Hobbs, O.St.J., D.Sc., F.R.C.Path., Dip.Bact., Food Hygiene Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Fungi (pathogenic), identification

Mycological Reference Laboratory, London School of Hygiene and Tropical Medicine, Keppel Street, London, WC1E 7HT. *Tel.:* 01-636 8636.

Helminthological specimens, investigation

Professor G. S. Nelson, M.D., D.Sc., M.R.C.P., D.T.M.&H., D.A.P.&E., London School of Hygiene and Tropical Medicine, Keppel Street, London, WC1E 7HT. *Tel.:* 01-636 8636.

Hydatid disease, complement-fixation test for

Mrs. C. M. Patricia Bradstreet, M.B., F.R.C.Path., Dip.Bact., Standards Laboratory for Serological Reagents, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Immunofluorescence

C. E. D. Taylor, M.A., M.D., F.R.C.Path., Dip.Bact., Central Middlesex Hospital, Park Royal, London, NW10 7NT. *Tel.:* 01-965 5733.

Influenza

Mrs. Marguerite S. Pereira, M.D., Virus Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT.
Tel.: 01-205 7041.

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* Owing to the perishable nature of most foodstuffs, material for investigation from outbreaks of food poisoning should normally be sent to the nearest public health laboratory. The reference laboratory should be used mainly for non-perishable articles of food, especially when litigation may arise, and for the identification of strains.

Listeria typing

Mrs. Agnes J. Macara, B.Sc., Standards Laboratory for Serological Reagents, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Meningococci, typing

Mrs. C. M. Patricia Bradstreet, M.B., F.R.C.Path., Dip.Bact., Standards Laboratory for Serological Reagents, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Parasitic infections, serological diagnosis of

D. S. Ridley, B.Sc., M.D., F.R.C.Path., Department of Pathology, Hospital for Tropical Diseases, 4 St. Pancras Way, London, NW1 0PE. *Tel:* 01-387 4411. (Tests available for *Chagas' disease*, *Cyticercosis*, *Fascioliasis*, *Filariasis*, *Kala azar*, *Schistosomiasis*, *Trichinosis*).

Plague, investigation

R. J. Henderson, M.D., Public Health Laboratory, Royal Infirmary, Castle Street Branch, Worcester, WR1 3AS. *Tel.:* Worcester (STD 0905) 25238/9.

Pneumococci, typing of, from epidemics

M. T. Parker, M.D., F.R.C.Path., Dip.Bact., Cross-Infection Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Poliomyelitis, marker tests

Miss Yvonne E. Cossart, M.B., B.Sc., M.R.C.Path., D.C.P., Virus Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Protective cabinets

O. M. Lidwell, D.Phil., Cross-Infection Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT.
Tel.: 01-205 7041.

Psittacosis, isolation of causative agent

Virus Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Rabies, laboratory tests for diagnosis

Miss Sylvia D. Gardner, M.B., M.R.C.Path., Dip. Bact., Virus Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Rickettsia

A. D. Evans, M.B., B.Sc., M.R.C.Path., Dip.Bact., Public Health Laboratory, University Hospital of Wales, Heath Park, Cardiff, CF4 4XW.
Tel.: Cardiff (STD 0222) 755944.

Salmonella, typing

B. Rowe, M.A., M.B., D.T.M.&H., Salmonella and Shigella Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Shigella sonnei, confirmation and typing

Miss Joan R. Davies, M.D., Dip.Bact., Public Health Laboratory, St. Luke's Hospital, Guildford, Surrey. *Tel.:* Guildford (STD 0483) 66091.

Shigella (all sub-groups other than *Shigella sonnei*) and related organisms

B. Rowe, M.A., M.B., D.T.M.&H., Salmonella and Shigella Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Smallpox, laboratory tests for diagnosis

Birmingham: H. S. Bedson, M.D., M.R.C.P.,
Professor P. Wildy, M.B., M.R.C.S., F.R.S.E.,
Department of Virology, The University, Birmingham, B15 2TJ.
Tel.: 021-472 1301. *Night extension:* 021-472 3524.

Bristol: Miss Suzanne K. R. Clarke, M.D., F.R.C.Path., Public Health Laboratory, Myrtle Road, Kingsdown, Bristol, BS2 8EL.
Tel.: Bristol (STD 0272) 21326.

Cardiff: A. D. Evans, M.B., B.Sc., M.R.C.Path., Dip. Bact., Public Health Laboratory, University Hospital of Wales, Heath Park, Cardiff, CF4 4XW.
Tel.: Cardiff (STD 0222) 755944.

Leeds: M. H. Hambling, M.D., M.R.C.Path., D.(Obst.)R.C.O.G., Dip. Bact., Public Health Laboratory, Bridle Path, York Road, Leeds, LS15 7TR.
Tel.: Leeds (STD 0532) 645011.

Liverpool: Professor K. McCarthy, M.D., F.R.C.Path., Department of Medical Microbiology, New Medical School, University of Liverpool, P.O. Box 147, Liverpool, L69 3BX. *Tel:.* 051-709 6022 *Ext.* 202.

London: Mrs. Marguerite S. Pereira, M.D., Virus Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT.
Tel.: 01-205 7041.

Newcastle: J. H. Hale, O.B.E., M.D., F.R.C.Path., M.R.C.P., Public Health Laboratory, Institute of Pathology, General Hospital, Westgate Road, Newcastle upon Tyne, NE4 6BE.
Tel.: Newcastle (STD 0632) 38811, *Ext.* 297.

Staphylococcal enterotoxin, typing

R. J. Gilbert, M.Pharm., Ph.D., Dip.Bact., M.P.S., Food Hygiene Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Staphylococci, bacteriophage-typing

M. T. Parker, M.D., F.R.C.Path., Dip.Bact., Cross-Infection Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Streptococci of Group A, typing

M. T. Parker, M.D., F.R.C.Path., Dip.Bact., Cross-Infection Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

Regional Typing Laboratories

(i) *Northern and South-Eastern Counties:* Cumberland, Co. Durham, Lancs., Northumberland, Westmorland, Yorks., Dorset, Hants., Kent, London, Surrey, Sussex.

M. T. Parker, M.D., F.R.C.Path., Dip.Bact., Cross-Infection Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

(ii) *Eastern Counties:* Beds., Cambs., Derby, Essex, Herts., Hunts., Leics., Lincs., Norfolk, Northants., Notts., Rutland, Suffolk.

Miss Joan M. Boissard, M.R.C.S., Public Health Laboratory, Tennis Court Road, Cambridge, CB2 1QR. *Tel.:* Cambridge (STD 0223) 55526 and 57573.

(iii) *Western Counties:* Berks., Bucks., Cheshire, Cornwall, Devon, Glos., Hereford, Oxon., Salop, Somerset, Staffs., Warw., Wilts., Worcs.

Public Health Laboratory, Radcliffe Infirmary, Oxford, OX2 6AH.
Tel.: Oxford (STD 0865) 49231/2.

(iv) *Wales.*

Professor Scott Thomson, M.D., F.R.C.P.E., F.R.C.Path., D.P.H., Department of Microbiology, University Hospital, Heath Park, Cardiff, CF4 4XW.
Tel.: Cardiff (STD 0222) 755944.

Toxoplasmosis

North

G. B. Ludlam, M.D., F.R.C.Path., D.T.M.&H., D.L.O., Public Health Laboratory, Bridle Path, York Road, Leeds, LS15 7TR.
Tel.: Leeds (STD 0532) 645011.

South (excluding London)

W. Kwantes, M.A., M.B., F.R.C.Path., Dip.Bact., Public Health Laboratory, Cockett Road, Swansea, SA2 0FA. *Tel.:* Swansea (STD 0792) 24041.

London

D. G. Fleck, M.D., M.R.C.Path., Dip.Bact., Public Health Laboratory, St. George's Hospital, Blackshaw Road, London, SW17 0QT.
Tel.: 01-672 1255.

Trichinosis, examination of rats and pigs

Professor G. S. Nelson, M.D., D.Sc., M.R.C.P., D.T.M.&H., D.A.P.&E., London School of Hygiene & Tropical Medicine, Keppel Street, London, WC1E 7HT. *Tel.:* 01-636 8636.

Tubercle bacilli and other mycobacteria

J. Marks, M.D., F.R.C.P., F.R.C.Path., Dip.Bact., Tuberculosis Reference Laboratory, University Hospital of Wales, Heath Park, Cardiff, CF4 4XW. *Tel.:* Cardiff (STD 0222) 755944, *Ext.* 2049.

Regional Centres for Tuberculosis Bacteriology

Birmingham: F. A. J. Bridgwater, M.B., M.R.C.Path., Dip. Bact., Public Health Laboratory, East Birmingham Hospital, Bordesley Green East, Birmingham, B9 5ST.
Tel.: 021-772 4311.

Bristol: H. R. Cayton, M.B., F.R.C.Path., Public Health Laboratory, Myrtle Road, Kingsdown, Bristol, BS2 8EL. *Tel.:* Bristol (STD 0272) 291326.

Liverpool: G. C. Turner, M.D., F.R.C.Path., Public Health Laboratory, Fazakerley Hospital, Lower Lane, Liverpool, L9 7AL.
Tel.: 051-525 2323.

London: C. H. Collins, M.B.E., M.I.Biol., F.I.M.L.T., Bacteriological Laboratory (P.H.L.S.), Room 617, County Hall, Westminster Bridge, London, S.E.1. *Tel.:* 01-928 3467.

Manchester: J. D. Abbott, M.D., F.R.C.Path., Dip.Bact., Public Health Laboratory, Withington Hospital, Manchester, M20 8LR.
Tel.: 061-445 2416.

Newcastle: J. B. Selkon, M.B., M.R.C.Path., D.C.P., Public Health Laboratory, Institute of Pathology, General Hospital, Westgate Road, Newcastle upon Tyne, NE4 6BE. *Tel.:* Newcastle (STD 0632) 38811, *Ext.* 276/7.

Wakefield: L. A. Little, M.B., F.R.C.Path., Dip.Bact., Public Health Laboratory, Wood Street, Wakefield, WF1 2HL. *Tel.:* Wakefield (STD 0924) 76961.

Typhus fever, serological tests*

Virus Reference Laboratory, Central Public Health Laboratory, Colindale Avenue, London, NW9 5HT. *Tel.:* 01-205 7041.

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* The Weil-Felix test can be carried out in all constituent laboratories of the Service, and also in a number of hospital laboratories. Only sera giving a doubtful reaction should be sent to the Virus Reference Laboratory.

Venereal diseases, Treponemal immobilisation test

A. E. Wilkinson, M.B., F.R.C.Path., M.R.C.S., Venereal Diseases Reference Laboratory, London Hospital Research Laboratories, Ashfield Street, London, E1 2BL. *Tel.:* 01-790 3008.

Midlands

P. J. L. Sequiera, M.B., The Central Serology Laboratory, Withington Hospital, West Didsbury, Manchester, M20 8LR.
Tel.: Manchester (STD 061-445) 7683.

North

J. H. Hale, O.B.E., M.D., F.R.C.Path., M.R.C.P., Public Health Laboratory, Institute of Pathology, General Hospital, Westgate Road, Newcastle upon Tyne, NE4 6BE. *Tel.:* Newcastle (STD 0632) 38811, *Ext.* 297.

Vibrio parahaemolyticus

G. I. Barrow, M.D., M.R.C.Path., Dip. Bact., Public Health Laboratory, Royal Cornwall Hospital (City), Infirmary Hill, Truro.
Tel.: Truro (STD 0872) 3029.

Yersinia pseudotuberculosis and *Yersinia enterocolitica*

N. S. Mair, M.B., F.R.C.Path., D.C.H., D.P.H., Dip.Bact., Public Health Laboratory, Groby Road Hospital, Leicester, LE3 9GE.
Tel.: Leicester (STD 0533) 872283.

VACCINES AND OTHER IMMUNOLOGICAL MATERIALS OBTAINABLE THROUGH THE PUBLIC HEALTH LABORATORY SERVICE

For the address of P.H.L.S. laboratories *see* pp. 32–44

**Rabies Vaccine and Antiserum*

Stocks are held by the P.H.L.S. laboratories at:

Liverpool
London (Colindale)
Newcastle
Cardiff

Anthrax Vaccine

Stocks are held by the P.H.L.S. laboratories at:

Leeds
Liverpool
London (Colindale)

Human immunoglobulin

Immunoglobulin prepared from the pooled plasma of normal healthy adults is obtainable on request from regional or area laboratories. In the past this product has been used for the protection of women in contact with rubella during the first three months of pregnancy, often without estimations of serum antibody levels to see if they are at risk or not. In the light of recent trials it is recommended that all such women should be bled and their immune status determined and, in areas where this answer is available within a few days, for immunoglobulin to be reserved for those found to be susceptible. It is important to advise, however, that the use of immunoglobulin will not prevent infection although it may have a marginal effect on the incidence of abnormalities in the baby if a clinical infection is turned into a non-clinical one. If serological studies show that a susceptible woman could have been infected by rubella virus during the early part of pregnancy, the question of termination should be discussed with her general practitioner, whose duty it is to give her advice.

Immunoglobulin is also used for the prevention of infectious hepatitis in circumstances of special risk. It may likewise be used for contacts of measles where it is important to prevent infection. A separate preparation labelled " Human Normal Immunoglobulin (for use with Measles Vaccine) " is also available. This is issued in bulk to local health authorities to meet individual requests from doctors. This special preparation is intended for use only in children whose state of health is such as to make it necessary to ensure the absence of any marked febrile reaction to measles vaccine. It is not obtainable directly from Public Health Laboratories but from Local Health Authorities.

**Anti-vaccinia human immunoglobulin*

In addition to normal human immunoglobulin, a stock of immunoglobulin prepared from the blood of persons recently vaccinated against smallpox is held for the treatment of cases of generalised vaccinia, eczema, vaccinatum, accidental vaccinia infections endangering the eye, and, in special circumstances, for the protection of unvaccinated smallpox contacts. This anti-vaccinia human immunoglobulin may be obtained from the P.H.L.S. laboratories at:

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* Urgent requests for rabies vaccine or antiserum and anti-vaccinia human immunoglobulin only are received at any time at the Central Public Health Laboratory, Colindale.

Birmingham
Bristol
Cambridge
Cardiff
Gloucester
Leeds
Leicester
Liverpool
London (Colindale)
Manchester
Newcastle
Oxford
Sheffield

Material for intradermal diagnostic tests

Frei antigen for Lymphogranuloma inguinale, Brucellin for Undulant fever, Trichina antigen for Trichinosis, Hydatid antigen for Hydatid disease, and cat-scratch fever antigen can be obtained from the P.H.L.S. Standards Laboratory, which also issues, to any pathologist, Kveim antigen for sarcoidosis. Enquiries relating to fungal antigens should be addressed to the P.H.L.S. Mycology Reference Laboratory.

Notes on other immunological materials obtainable from special centres:

1. *Antisera for therapeutic use*

Obtainable through the Hospital Pathological Service (see appendix to HM (71)64) from which the list below is abstracted:

(a) anthrax antiserum
(b) botulinum antitoxin
(c) human antitetanus immunoglobulin
(d) ovine antitetanus serum

Note: L = Pathology Laboratory
P = Pharmacy

Region 1

L	Carlisle, Cumberland Infirmary	abcd
P	Newcastle, General Hospital	abcd
	Catterick, O.C. Military Hospital	c

Region 2

P	Hull, Castle Hill Hospital	abcd
P	Leeds, Seacroft Hospital	abcd

Region 3

P	Nottingham, City Hospital	abcd

Region 4

	Cambridge, Director, Regional Transfusion Centre	abcd

Region 5

P	London, N.7, Royal Northern Hospital	a
P	Edgware, General Hospital	bcd

Region 6

L	London, N.18, North Middlesex Hospital	abcd
	Colchester, O.C. Military Hospital	c

Region 7

	Southborough, Director, S.E. Depot, Blood Transfusion Centre	abcd

Region 8

	Tooting, Director, South London Transfusion Centre, Tooting Grove	abcd
	Aldershot, O.C. Cambridge Military Hospital	c

Region 9

L	Northampton, General Hospital	abcd
P	Reading, Royal Berks. Hospital	abcd
P	Oxford, Churchill Hospital (day only)	c
P	Oxford, Radcliffe Infirmary (day only)	d

Region 10

P	Bristol, Ham Green Hospital	abcd
P	Exeter, Royal Devon and Exeter Hospital	abcd
	Plymouth, O. i/c Accident Department, General Hospital, Freedom Fields	abcd
P	Truro, Royal Cornwall Hospital, Treliske Branch	abcd

Region 11

P	Cardiff, Royal Infirmary	abcd
P	Bangor, Caernarvon and Anglesey General Hospital	abcd
P	Wrexham, Maelor General Hospital	abcd
P	Swansea, Singleton Hospital, Sketty	ab
P	Carmarthen, West Wales General Hospital	bcd
P	Aberystwyth, Bronglais District General Hospital	bcd

Region 12

P	Shrewsbury, Royal Salop Infirmary	acd
P	Birmingham 29, Selly Oak Hospital	abcd
P	Stoke-on-Trent, North Staffs Royal Infirmary	acd

Region 13

P	Manchester, Royal Infirmary	abcd

Region 14

P	Liverpool 9, Fazakerley Hospital	abcd

Region 15

P	Southampton, Royal South Hants. Hospital	abcd
P	Salisbury, Odstock Hospital	a
	Salisbury, Officer-in-Charge, Accident Department, General Hospital	cd
L	Dorchester, Director, Public Health Laboratory	cd
P	Portsmouth, Royal Portsmouth Hospital	cd

2. *Yellow fever inoculation*
   A list of centres can be obtained from the Department of Health and Social Security, Alexander Fleming House, Elephant and Castle, London, S.E.1.

3. *TABC, cholera, typhus and other vaccines*
   Most of these are available commercially.

4. *Smallpox Vaccine*
   Obtainable from Public Health Departments of Local Authorities (Counties, County Boroughs and London Boroughs).

APPENDIX I

COMMITTEES AND WORKING PARTIES

Communicable Disease Report Working Party

Chairman: T. M. Pollock, M.B., M.R.C.P. (Glasg.)
Secretary: Mrs. Enid D. Vernon, B.Sc.

H. R. Cayton, M.B., F.R.C.Path.
Miss Lynette M. Dowsett, M.D., F.R.C.Path.
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G. L. Gibson, M.D., F.R.C.Path.
M. H. Hughes, M.A., D.M., F.R.C.Path., D.T.M.&H., Dip.Bact.
J. C. Kelsey, M.D., F.R.C.Path., Dip.Bact.
S. P. Lapage, M.B., F.R.C.Path., Dip.Bact.
E. R. Mitchell, M.B., M.R.C.Path., Dip.Bact.
B. Moore, M.D., B.Sc., F.R.C.Path.
C. A. Morris, B.Sc., M.D., Dip.Bact.
N. D. Noah, M.B., M.R.C.P.
J. W. G. Smith, M.D., M.R.C.Path., M.F.C.M., Dip.Bact.
Mrs. Hilary E. Tillett, M.Sc.
J. O'H. Tobin, B.M., F.R.C.Path., M.R.C.P., Dp.Bact.
R. H. Westlake

Working Party on Epidemic Non-Bacterial Gastro-Enteritis

Chairman: B. Moore, M.D., B.Sc., F.R.C.Path.

Secretary: Miss Suzanne K. R. Clarke, M.D., F.R.C.Path.

M. H. Hughes, M.A., D.M., F.R.C.Path., D.T.M.&H., Dip.Bact.
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E. R. Mitchell, M.B., M.R.C.Path., Dip.Bact.
T. D. F. Money, M.A., M.B., D.(Obst.)R.C.O.G.
J. O'H. Tobin, B.M., F.R.C.Path., M.R.C.P., Dp.Bact.
J. E. M. Whitehead, M.B., F.R.C.Path., Dip.Bact.
J. Barnes, M.B., M.Sc., D.P.H. (*Department of Health and Social Security*)

Joint Public Health Laboratory Service/Animal Health Division Standing Advisory Committee

P.H.L.S. Members

Professor E. S. Anderson, M.D., F.R.C.Path., Dip.Bact., F.R.S.
J. H. McCoy, M.B., D.P.H.
D. J. H. Payne, M.B., F.R.C.Path., M.R.C.P., Dip.Bact.

Veterinary Members

A. C. L. Brown, M.R.C.V.S.
M. L. Burdin, O.B.E., B.Sc., M.R.C.V.S.
A. J. Stevens, M.A., B.V.Sc., M.R.C.V.S., Dip.Bact.

Working Party on Farmer's Lung

Chairman and Secretary: D. W. R. Mackenzie, B.Sc., Ph.D.

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J. E. Jameson, M.R.C.S.
B. Moore, M.D., B.Sc., F.R.C.Path.
C. A. Morris, B.Sc., M.D., Dip.Bact.
Miss Christine M. Philpot, B.Sc.
M. Sussman, B.Sc., Ph.D., M.I.Biol. (*Department of Medical Microbiology, The Welsh National School of Medicine*)
D. M. Weir, M.D. (*Department of Bacteriology, Edinburgh University Medical School*)

Advisory Sub-Committee on Application and Report Forms

Chairman: R. Pilsworth, M.D., Dip.Bact.
Secretary: G. H. Tee, F.R.C.Path., M.R.C.S., Ph.D.

Advisory Sub-Committee on Laboratory Supplies

Chairman: Miss Joan R. Davies, M.D., Dip.Bact.
Secretary: A. Waltho

Library Advisory Committee

Joint Chairmen:
B Moore, M.D., B.Sc., F.R.C.Path.
Miss Betty H. Whyte, M.A., A.L.A.
Secretary: Miss Betty H. Whyte, M.A., A.L.A.

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Chairman: J. H. Hale, O.B.E., M.D., F.R.C.Path., M.R.C.P.
Secretary: A. Waltho

Standing Committee on Technicians

Chairman: R. J. Henderson, M.D.
Secretary: B. D. Cunningham

Working Parties on Acute Respiratory Virus Infections

(Working in collaboration with the Medical Research Council Working Party)

Group I: Acute Respiratory Virus Infections in General Practice

Chairman: P. G. Higgins, M.D., M.R.C.Path., Dip.Bact.

Joint Secretaries:

R. E. Hope-Simpson, O.B.E., F.R.C.G.P., M.R.C.S.
D. L. Miller, M.D., D.P.H.

Group III: Acute Respiratory Virus Infections among Children in Hospital

Chairman, Laboratory Group: J. O'H. Tobin, B.M., F.R.C.Path., M.R.C.P., Dp.Bact.
Chairman, Clinical Group: Professor S. D. M. Court, M.D., F.R.C.P., D.C.H. (*University of Newcastle*)

Secretary: Miss Pauline M. Poole, M.D., M.R.C.Path., B.A.O., Dip.Bact.

Advisory Committee on Viral Reagents

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Committee on Infection Risks of Haemodialysis

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Committee and Working Party on Whooping Cough

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Working Party on Microbiological Specifications for Food

Chairman: Miss Betty C. Hobbs, O.St.J., D.Sc., F.R.C.Path., Dip.Bact.

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Standing Committee on Degree Level Diploma in Medical Technology

Chairman: J. C. Kelsey, M.D., F.R.C.Path., Dip.Bact.

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R. A. Quaife, F.I.M.L.T.
G. C. Turner, M.D., F.R.C.Path.
P. J. Wormald, M.D., F.R.C.Path.

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P. G. Mann, M.D., M.R.C.Path., Dip.Bact.
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M. T. Parker, M.D., F.R.C.Path., Dip.Bact.
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B. T. Thom, M.B., M.R.C.Path., Dip.Bact.
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J. C. Gould, M.D., F.R.S.E., F.R.C.P. (Edin.), M.R.C.Path. (*Central Microbiological Laboratory, Edinburgh*)
R. C. Tyldesley, M.B. (*Kingswood Approved School, Bristol*)

Standing Committee on Quality Control

Chairman: R. Blowers, M.D., F.R.C.P., F.R.C.Path., Dip.Bact.

Secretary: J. D. Abbott, M.D., F.R.C.Path., Dip.Bact.

P. B. Crone, M.D., Dip.Bact.
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R. D. Gray, M.D., F.R.C.Path., D.P.H.
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S. P. Lapage, M.B., F.R.C.Path., Dip.Bact.
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Working Party on Hepatitis

Chairman: Miss Yvonne E. Cossart, M.B., B.Sc., M.R.C.Path., D.C.P.
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G. C. Turner, M.D., F.R.C.Path.
T. H. Flewett, M.D., F.R.C.Path. (*Regional Virus Laboratory, Birmingham*)
F. O. MacCallum, M.D., F.R.C.Path. (*Virology Department, Radcliffe Infirmary, Oxford*)

Working Party on Safety Requirements for the Installation and Operation of Centrifuges

Chairman: M. T. Parker, M.D., F.R.C.Path., Dip.Bact.

Miss Joan R. Davies, M.D., Dip.Bact.
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Standing Committee on Influenza

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C. H. L. Howells, B.Sc., M.D., F.R.C.Path.
Mrs. Hélène J. Mair, M.D., M.R.C.Path., Dip.Bact.
E. R. Mitchell, M.B., M.R.C.Path., Dip.Bact.
M. T. Parker, M.D., F.R.C.Path., Dip.Bact.
Mrs. Marguerite S. Pereira, M.D.
J. W. G. Smith, M.D., M.R.C.Path., Dip. Bact.
Professor D. L. Miller, M.D., D.P.H. (*Department of Social and Preventive Medicine, Middlesex Hospital, London*)
A. T. Roden, M.D., M.R.C.S., D.P.H. (*Department of Health and Social Security*)

Working Party on Brucellosis

Chairman: L. Robertson, M.A., B.M., F.R.C.Path., Dip.Bact.
Secretary: I. D. Farrell, B.Sc., Ph.D.

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R. J. Henderson, M.D.
C. H. L. Howells, B.Sc., M.D., F.R.C.Path.
D. J. H. Payne, M.B., F.R.C.Path., M.R.C.P., Dip.Bact.
J. G. Wallace, B.M., M.R.C.Path., D.C.P., Dip.Bact.

APPENDIX II

PUBLICATIONS BY MEMBERS OF THE STAFF OF THE PUBLIC HEALTH LABORATORY SERVICE DURING 1972

Besides the specific items mentioned below, there are many publications to which the work of the Service has contributed. The internationally recognised reference laboratories and the Epidemiological Research Laboratory submit figures regularly to W.H.O. for inclusion in their statistical periodicals. Again, the giving of specialist help and advice and the supply of serological reagents are among the functions of the Service, and in the course of the year a number of papers have acknowledged such contributory work by members of the staff. Other unlisted material includes leading articles, unsigned annotations, conference papers which remain unpublished, book reviews, contributions to the various abstracting journals, and notes compiled from the Service's weekly Communicable Disease Report which appear regularly in the Brit. med. J. *and elsewhere.*

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APPENDIX III

AWARDS AND EXTERNAL OFFICES ACCEPTED BY MEMBERS OF THE SERVICE DURING 1972

Mr. C. H. Collins	M.B.E. in the Birthday Honours List.
Dr. G. L. Gibson	Honorary Assistant Secretary, Association of Clinical Pathologists; Honorary Secretary, Committee on Technical Methods, Association of Clinical Pathologists.
Dr. R. J. Gilbert	World Health Organisation Consultancy, Bangkok.
Dr. E. J. G. Glencross	Chairman, Division of Pathology and Radiology, Peterborough and Stamford Group; Secretary, Medical Executive Committee.
Dr. C. H. L. Howells	Control of Infection Officer, University Hospital of Wales, Cardiff.
Dr. M. H. Hughes	Vice-Chairman, Hampshire County Health Committee.
Dr. H. H. Johnston	Member, Regional Scientific Advisory Committee, Oxford Regional Hospital Board; Member, Working Party on Manufacture and Supply of Infusion Fluids, Oxford Regional Hospital Board.
Dr. J. C. Kelsey	Member, Board of Studies in Microbiology, University of London; Member, Advisory Committee on Microbiology in Schools.
Dr. S. P. Lapage	Member, Taxonomic Sub-Committee on Enterobacteriaceae of the International Committee on Systematic Bacteriology; Member, Data Coding Sub-Committee of the World Federation for Culture Collections; Member, Council of the Systematics Association.
Dr. J. Marks	Marc Daniels Lecturer for 1973, Royal College of Physicians.
Dr. P. D. Meers	Clinical Tutor, Plymouth Clinical Area.
Dr. Sheila Polakoff	Lecturer in Epidemiology, Royal Institute of Public Health and Hygiene; Member, Medical Research Council Sub-Committee on Hepatitis Prevention in Renal and Associated Units; Member, Medical Research Council Working Party on the Clinical Use of Specific Immunoglobulin in Australia Antigen Associated Hepatitis.
Dr. Pauline M. Poole	Secretary, Chester and North Wales Medical Society.
Dr. B. Rowe	Head of World Health Organisation International Shigella Centre, London; Member, Taxonomic Sub-Committee on Enterobacteriaceae of the International Committee on Systematic Bacteriology.
Mr. M. W. Scruton	Moderator/Assessor in Medical Microbiology for Higher National Certificate of the University of Hong Kong.
Mr. A. J. Smith	Member, Institute of Medical Laboratory Technology Virology Advisory Panel.

Dr. J. W. G. Smith ..	Member, Medical Research Council Committee on Influenza and Other Respiratory Vaccines; Member, Department of Health and Social Security Advisory Group on Protection Against Tetanus.
Dr. C. E. D. Taylor ..	Honorary Secretary, Commission on World Standards of the World Association of Societies of Pathology.
Mr. K. L. Thomas	Member, Joint Committee for Higher National Certificates and Diplomas in Medical Laboratory Subjects.
Dr. J. O'H. Tobin	Member, Panel of Examiners in the special subject of Virology, Royal College of Pathologists.
Dr. G. C. Turner	Member, Board of Postgraduate Studies, Association of Clinical Pathologists.
Dr. J. E. M. Whitehead ..	Member, Regional Scientific Advisory Committee, Birmingham Regional Hospital Board.

APPENDIX IV

VISITS ABROAD BY MEMBERS OF THE SERVICE DURING 1972

Dr. E. S. Anderson	Participation in teaching course on the use of antibiotics in animal feeds, at Harvard School of Public Health, Cambridge, Mass., U.S.A. Annual General Meeting of the Editorial Committee of the Annales de l'Institut Pasteur, Paris.
Dr. C. M. Patricia Bradstreet	Geneva, to review the World Health Organisation's reagents programme.
Dr. Yvonne E. Cossart	IXth Congress of the European Dialysis and Transplant Association, Florence, Italy.
Dr. A. D. Evans	On behalf of the World Health Organisation Consultancy; short term in Thailand.
Dr. A. L. Furniss	World Health Organisation Course on Cholera, Accra.
Dr. R. J. Gilbert	World Health Organisation Consultancy, Bangkok.
Dr. E. H. Gillespie	International Symposium on Industrial Sterilisation, Amsterdam, Holland.
Dr. R. W. S. Harvey	Department of Hygiene and Epidemiology, University of Athens.
The late Dr. L. Hoyle	ICRO/UNESCO training course for virologists, Institute of Virology, Bratislava, Czechoslovakia.
Dr. P. A. Jenkins	International Colloquium of the Institute of Tropical Medicine, Antwerp, Belgium.
Dr. A. E. Jephcott	Symposium on Neisseria Gonorrhaeae, Philadelphia; Venereal Diseases Laboratory, Communicable Diseases Center, Atlanta, U.S.A.
Dr. H. H. Johnston	France, to examine commercial sources of intravenous influsion fluids on behalf of the Oxford Regional Hospital Board.
Dr. D. M. Jones	IXth Congress of the European Dialysis and Transplant Association, Florence, Italy.
Dr. J. C. Kelsey	International Colloquium on European Standards on Disinfection, Hamburg, Germany; Panel on the revision of the recommended International Atomic Energy's Code of Practice for the radiation sterilisation of biochemical products, Risø, Denmark.
Dr. S. P. Lapage	Sao Paulo, Brasil, to discuss possible support from the United Nations Organisation to the World Federation of Culture Collections, and to act as one of the organisers for an International Conference on Culture Collections and a training course, to be held in Sao Paulo, Brasil in July 1973.
Dr. Helene S. Mair	International Symposium on Yersinia, Pasteurella and Francisella, Malmo, Sweden.
Dr. N. S. Mair	International Symposium on Yersinia, Pasteurella and Francisella, Malmo, Sweden.

Dr. W. R. Maxted	Vth International Symposium on *Streptococcus pyogenes*, Amsterdam, Holland.
Dr. B. Moore	World Health Organisation Meeting on Health Criteria for the Quality of Recreational Waters, Ostend, Belgium; World Health Organisation training course on the epidemiology of waterborne disease, Aarhus, Denmark.
Dr. M. T. Parker	Geneva, to review present situation regarding major hospital infections and methods of control; International Aerobiology Symposium, Enschede, Holland.
Dr. Marguerite S. Pereira	Meeting on new concepts in Immunity in Viral and Rickettsial Diseases, Israel.
Mrs. Alison M. Pinney	Vth International Symposium on *Streptococcus pyogenes*, Amsterdam, Holland.
Dr. Sheila Polakoff	IXth Congress of the European Dialysis and Transplant Association, Florence, Italy.
Dr. C. E. D. Taylor	World Health Organisation, Geneva, to assist in defining future activities in the field of rapid methods and automation in microbiology; VIII World Congress of Anatomic and Clinical Pathology, Munich, Germany.
Dr. J. O'H. Tobin	Russia, as a member of the British Council Virology Delegation.
Dr. Adeline G. Towers	International Aerobiology Symposium, Enschede, Holland.
Dr. Jean P. Widdowson	Vth International Symposium on *Streptococcus pyogenes*, Amsterdam, Holland.
Dr. A. T. Willis	International Conference on Anaerobic Bacteria, Atlanta, U.S.A.

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